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EDITORIAL

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CLINICAL CASES

HOSPITAL GENERAL de MÉXICO
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EDITORIAL

Work, health, and costs; a relevant reflection

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The physical and mental health of workers in the workplace has an influence on overall productivity; impaired health gives rise to an increase in "accident rates" and generates a negative financial impact. To a large extent, this determines a company's occupational risk levels and with it the calculation of an employer's contributions to social security.

Workers spend at least a third of their day at work, where, in addition to striving to meet their production goals, they are given the opportunity to perform health promotion and maintenance activities in the workplace with the aim of reducing levels of poor health and improving quality of life, initiatives that will benefit the company's productivity.

There is sufficient and solid evidence illustrating that investment in occupational health promotion programs produces financial benefits for organizations based on the reduction of medical care costs and favors better productivity management strategies. For example, the University of Michigan Health Management Research Center (HMRC) estimates that an organization saves around 350 United States dollars (USD) a year for each worker classified as "low risk" by keeping them under this status[1].

The results of 56 studies addressing occupational health promotion topics and programs showed the following average reductions:

- Absenteeism due to illness by 27%.
- The cost of medical care by 26%.
- The administrative costs for disabilities and workers' compensation by 32%.
- The return on investment (ROI) ratio is USD 5.81 for every dollar invested[1].

A review article including 18 studies highlighted the reduction in absenteeism after the implementation of a health promotion program. A "cost-benefit" analysis conducted on six studies illustrated that the savings attributable to this program amounted to an average of USD 5.07 for every dollar invested. Twenty-eight out of 32 intervention studies carried out showed that health-care costs dropped after the implementation of a health promotion program and 10 studies reported cost-benefit ratios with average savings of USD 3.93 for every dollar invested.

Other studies have shown that companies can earn USD 3-USD 6 for every dollar spent on health promotion. Many researchers believe that indirect productivity-related savings are twice the direct costs of healthcare, which can be measured more accurately[1].

Diabetes

This disease is extremely costly within a family, work, and social context. Training employees to prevent or control diabetes will make them healthier and more productive, thereby reducing health-care costs for both workers and the company. Well-informed employers are fully aware that helping employees with diabetes to get healthier is "good for business".

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In the USA, the total costs arising from diabetes care have been documented at around USD 327 billion; direct expenses (USD 237 billion) correspond to hospitalization (30%), medicines to treat complications (30%), anti-diabetic medicines and diabetes supplies (15%), and doctor's appointments (13%), while indirect costs amount to almost USD 90 billion, including USD 3.3 billion in increased absenteeism, USD 26.9 billion in reduced productivity at work among the employed population, USD 2.3 billion in employment benefits for illness-related disability, USD 37.5 billion in reduced productivity among the unemployed population and USD 19.9 billion in lost productivity due to 277,000 premature deaths attributed to diabetes[2,3].

Another study pointed out that annual costs are nearly one-third higher for people that develop diabetes in subsequent years compared to people that do not progress from pre-diabetes to diabetes, with an average difference of USD 2671 a year. Due to this difference in cost, it is estimated that the 3-year ROI amounts to 42% thanks to a national program for the prevention of diabetes. These results illustrate the importance and the economic benefits these intervention programs produce in lifestyles to prevent or delay the onset of Type-2 diabetes[4]. Another study conducted an analysis of disease management costs combined with diabetes education and reported an ROI of USD 4.34 for every dollar invested[5].

Obesity

The increasingly significant association between a high body mass index (BMI) and high health-care costs provides the basis for strategies geared to the effective control of obesity. Such strategies should be an important part of health promotion programs both in the workplace and in the community. Different studies highlight the fact that obese employees spend 77% more on medication than non-obese employees and 72% of their medical care involves preventable conditions.

A 2008 study found that moderately obese (BMI ≥ 30) to extremely obese (BMI ≥ 40) employees underwent a 4.2% of loss in productivity due to weight-related health issues, equivalent to USD 506 dollars of lost productivity per worker per year[1].

Another study focused on 29 workplaces and 179,708 health-related episodes in 10,853 employees calculated the economic impact of obesity. When comparing workplaces with a high obesity rate to those with a lower rate, the study concluded that the former registered:

- 348.4 more episodes of general care for every 1000 employees ($p < 0.001$).
- 38.6 more episodes of hypertension care for every 1000 employees ($p < 0.001$).
- 2.5 more episodes of cerebrovascular disease (CVD) care for every 1,000 employees ($p = 0.017$).

Moreover, it represented a higher cost (USD 223) due to general episodes ($p < 0.001$); USD 169 due to hypertension ($p = 0.003$) and USD 1620 as a result of cerebrovascular events (CVD) ($p = 0.005$). The overall economic impact registered a higher cost per employee (USD 1.25), with an aggregate estimate per employee of USD 69 for general episodes, USD 89 for hypertension and USD 8 for CVD. The study concluded that care episodes were numerically more frequent and costly in workplaces with higher rates of obesity.

Studies related to overweight and obesity, physical inactivity, and smoking have shown that employees subject to these risks cost employers billions of dollars in excess health-care costs. For example, a joint study conducted by the Chrysler Corporation and the United Auto Workers Union revealed that workers with an unhealthy weight (BMI > 30) registered 143% more hospitalizations than those with a healthy weight (BMI < 25)[6,7].

Conclusions

Investing in a comprehensive employee health promotion program benefits organizations in terms of employee health management and productivity, as well as ensuring a better state of health and well-being.

There are absolutely NO workplaces in which health can be ignored, minimized, or taken lightly. The time has come to implement better health conditions and to promote and guarantee the best standards of health. Organizations, companies, and institutions must all invest in the omnipresent need for health, particularly in a nation – Mexico – that is already facing the challenges that affect its immediate future, which is highly uncertain due to the prevailing conditions and morbidity. Competence, competitiveness, productivity, performance, and profitability are all terms that rest and depend – among others things – on the health and well-being of those whose efforts are largely responsible for determining a nation's wealth: the workers.

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Conflicts of interest

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References

1. US. Chamber of Commerce. Healthy Workforce 2010 and Beyond. Available from: https://www.uschamber.com/assets/archived/images/documents/files/Healthyworkforce2010finalelectronicversion111709.pdf
2. American Diabetes Association. Economic costs of diabetes in the U.S. in 2017. Diabetes Care. 2018;41:917-28.
3. Khan T, Tsipas S, Wozniak G. Medical care expenditures for individuals with prediabetes: the potential cost savings in reducing the risk of developing diabetes. Popul Health Manag. 2017;20:389-96.
4. CDC. Diabetes. DSMES Toolkit. Building the Business Casa for DSMES. Available from: https://www.cdc.gov/diabetes/dsmes-toolkit/business-case/overview.html
5. Boren SA, Fitzner KA, Panhalkar PS, Specker JE. Costs and benefits associated with diabetes education-a review of the literature [PDF-142 KB] external icon. Diabetes Educ. 2009;35:72-96.
6. US. Chamber of Commerce. Healthy Workforce 2010 and beyond. Available from: https://www.uschamber.com/assets/archived/images/documents/files/healthyworkforce2010finalelectronicversion111709.pdf
7. Colombi AM, Wood GC. Obesity in the workplace: impact on cardiovascular disease, cost, and utilization of care. Am Health Drug Benefits. 2011;4:271-8.

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ORIGINAL ARTICLE

Study habits and academic performance in residents of orthopedics and family medicine

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Abstract

Objective: *To evaluate the study habits in the academic performance of residents of the specialties of Orthopaedics and Trauma (OT) and Family Medicine (MF).* **Methods:** *An observational study was carried out with OT and MF medical residents. An online survey was applied to them, with response options on the Likert scale, to evaluate study habits. For the statistical analysis, measures of central tendency and dispersion were used, as well as correlations, P < 0.05.* **Results:** *A sample of 112 participants. 51% of participants were male. Mean age of 30.1±3. 75% of participants were single. 84.8% study one hour. 84.8% of respondents answered that they were pursuing the specialty they wanted. 80.4% always or constantly understand what they read. 45.5% of participants draw diagrams or charts. Writing summaries (82.1%) is the most used technique for memorisation. 93.7% always or constantly attend classes on a regular basis. 94.6% of participants strongly agree or agree that study habits can influence academic performance. 58% presented regular habits, 22% good habits and 18% bad habits. It was found that there is a correlation between age and average academic performance (P = 0.016).* **Conclusions:** *Age and marital status had a direct association with academic performance. Most of the residents are satisfied with the specialty they are studying. Memorisation and writing summaries are the most used study habits. In general, residents have regular study habits.*

Keywords: *Study habits. Medical residents. Medical residency. Family medicine. Orthopaedics.*

Introduction

The resident physician or medical intern is an integral part of the hospital and is the cornerstone for its proper operation[1-3].

Improving medical services and training of health personnel requires a number of factors such as improved facilities, technological upgrading and better teaching conditions[4,5]. The training of medical specialists requires a holistic approach in order to meet the challenges that arise on a daily basis[6]. At present, medical practice, although it must go hand in hand with teaching in order to gain knowledge, is not always possible[7-9]. Many factors make it difficult for the resident physician to carry out their duties: lack of educational tools, extremely short study times, professors who are not fully qualified to teach[10-16].

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Efforts by hospital education departments to incorporate elements that enhance resident teaching are faced with heavy workloads, which hinder learning environments, making it difficult for academic interests to predominate in the training of medical specialists, resulting in academic dropout or tension for time and resources between educational and professional needs[17].

It is currently observed that the lack of good study habits and techniques has a direct impact on academic performance[3,18]. Some authors[19] point out that the main predictors of academic performance in medical residencies are the degree of anxiety, motivation and synthesis capacity. All the above makes us understand that this is a complex problem, which is why we focused on studying the habits of medical residents in the specialties of OT and FM, because of the impact they have and the increasing improvement of medical services.

Hence, the objective of this study was to evaluate the study habits in the academic performance of OT and FM residents; then, the causes that lead to poor or good academic performance were also analysed.

Method

An observational, analytical, prospective study was conducted among resident physicians in the OT and FM specialties. All those who agreed to participate and signed the informed consent letter were included. All resident physicians who were on holiday and/or those who did not complete the applied tests, or who were on rotating internship, were excluded.

In order to carry out the research, an online survey was developed using the Google Forms platform, which could be answered at any time. The survey consisted of 72 questions, including a comments section at the end. In the first section of the survey, participants had to fill out an informed consent letter, which was then printed and signed by all of them. In the second section of the survey, questions were asked about general aspects such as age, gender, university degree, specialty and educational institution where the resident physician studied to obtain their degree and their state of origin. In the third section, items assessed study habits in general and in other sections, items specifically related to satisfaction, reading comprehension, memorisation and learning tools. A fourth section assessed socio-economic aspects and family background as well as the resident physician's own expectations. All questions were answered using a Likert scale. Once the descriptive data of the survey was processed, the questions were weighted from 4 to 1. They were classified into several categories: excellent habits (165-184), good habits (147-164), regular habits (128-146) and bad habits (< 12).

Measures of central tendency and dispersion were used, as well as correlations. The significant statistic value was $P < 0.05$.

This study was subject to review and approval by the research and ethics committees. All participants were volunteers and signed the informed consent letter. The data collected was downloaded from the cloud and stored in a folder on a computer.

Results

A total sample of 112 participants, 51% male and 21% female, was obtained. In the distribution by specialty (50%) 56 resident physicians per specialty. The mean age was 30.1±3. Distribution by academic year and specialty, for first year FM residents (R1) 25%, second year (R2) 34% and third year (R3) 41%. OT: R1 34%, R2 20%, R3 30% and fourth year (R4) 16%. As for marital status, 75% were single, 24% married/common-law marriage and 1% divorced. Twenty percent had children and 80% had no children (Table 1).

The average score for the National Medical Residency Examination (ENARM) was 67.7 (80.4-52.00), while the current average is 91.3 (98.2-73.64).

Regarding the analysis of study habits, it was observed that in general 84.8% study for one hour on average. With regard to daily study as a learning option, 44.6% of respondents strongly agreed and 50.9% agreed. Furthermore, most respondents answered that they split their time throughout the week to study (Table 1).

In the satisfaction survey, 33.9% think that the specialty they are studying is what they expected, 63.4% answered that only sometimes and 84.8% answered that it was the specialty they wanted, while 15.17% do not think so (Table 2).

With regard to reading comprehension, 80.4% of the residents stated that they always or constantly understood what they rea., However, 45.5% drew diagrams or charts to organise and complete their studies, as well as concept maps, of which only 41.9% did so to pass their exams. Writing a summary for an exam is the most important memorisation and study technique for 59.8% of the respondents (Table 3).

With regard to memorising, writing down data is one of the most important techniques (82.1%) of the residents who always or constantly do so, as well as paying attention to the classes they attend (86.6%). In comparison, diagrams, charts and schematics or other resources are used by 61.6%. Fifty-seven point seven percent

Table 1. General overview of study habits

n = 112	n (%)
Hours of daily study	
< 1 hour	4 (3.6)
1 hour	95 (84.8)
> 3 hours	13 (11.6)
Daily study as a learning option	
Strongly disagree	3 (2.7)
Disagree	2 (1.8)
Agree	50 (44.6)
Totally agree	57 (50.9)
Teachers trained in education.	
Strongly disagree	2 (1.8)
Disagree	1 (0.9)
Agree	41 (36.6)
Totally agree	68 (60.7)
Attention to studies (concentration)	
Strongly disagree	4 (3.6)
Disagree	22 (19.6)
Agree	75 (67)
Totally agree	11 (9.8)
Distribution of study time during the week	
Strongly disagree	2 (1.8)
Disagree	16 (14.2)
Agree	79 (70.5)
Totally agree	15 (13.4)
Breaks during study time	
Strongly disagree	2 (1.8)
Disagree	19 (17)
Agree	77 (68.7)
Totally agree	14 (12.5)
Conscious intention to make use of time	
Strongly disagree	1 (0.9)
Disagree	3 (2.7)
Agree	89 (79.4)
Totally agree	19 (17)
Pursuit of studies even if not concentrating	
Strongly disagree	1 (0.9)
Disagree	15 (13.4)
Agree	83 (74.1)
Totally agree	13 (11.6)

Table 2. Satisfaction section

n = 112	n (%)
Expected specialty	
Never	3 (2.7)
Sometimes	71 (63.4)
Constantly	38 (33.9)
Thoughts of dropping out of specialty	
Never	77 (68.7)
Sometimes	35 (31.3)
Thoughts at the completion of the medical residency	
I had a precise idea of what specialty I wanted to pursue.	49 (43.8)
I was undecided between two or three specialities	53 (47.3)
I had no idea which specialty to take	7 (6.3)
I was not interested in pursuing a specialty	3 (2.7)
Current specialty is the one you wished to study	
Yes	95 (84.8)
No	17 (15.2)

of respondents always or almost always use mnemonics to memorise topics (Table 4).

Regarding learning tools, 93.7% responded that they always or constantly attend classes regularly and with a good attitude. As for homework, 85.7% answered that they always or constantly do homework as a learning method. Sixty-two point five percent of respondents answered that they sometimes copy and paste their homework, which represents more than half of the surveyed population (Table 5).

In the section on academic performance, 94.6% of participants responded that they strongly agree or agree that study habits can influence academic performance. Furthermore, 91.1% responded that they strongly agree or agree that they get a good grade. However, some respondents did not agree or strongly disagree that they have time to study and then perform well on a test (Table 6).

Overall, 58% of respondents had regular habits, 22% had good habits and 18% had bad habits. When analysing the correlation between variables, we observed that there was a correlation between age and average academic performance ($p = 0.016$) (Fig. 1). Between study habits and marital status, there is a correlation for those who are single ($p = 0.004$) and married/common-law marriage ($p = 0.009$), but not for those divorced ($p = 0.170$). In the correlation between gender and academic performance ($p = 0.545$), university of study and sum of study habits ($p = 0.899$), as well as between sum of study habits and year of specialisation ($p = 0.994$), the correlations were not statistically significant.

Discussion

Academic performance refers to the knowledge acquired throughout residency, which is related to study habits. The scales measuring these habits are most often classified as good or bad, with positive or negative consequences, which are reflected in the students' grades.

A variety of factors can influence academic performance. Gonzales[20] found that in Gynaecology and Obstetrics residents, economic and family factors affect

Table 3. Reading comprehension section

n = 112	n (%)
Attention to studies (concentration)	
Never	4 (3.6)
Sometimes	51 (45.5)
Constantly	49 (43.7)
Always	8 (7.1)
Arrangement of table, desk or their equivalents for study	
Never	5 (4.5)
Sometimes	23 (20.5)
Constantly	27 (24.1)
Always	57 (50.9)
Sufficient light when studying	
Sometimes	16 (14.3)
Constantly	38 (33.92)
Always	58 (51.8)
Reading comprehension	
Sometimes	22 (19.6)
Constantly	69 (61.6)
Always	21 (18.7)
Ability to distinguish the main fundamental points of each topic	
Sometimes	13 (11.6)
Constantly	71 (63.4)
Always	28 (25)
Drawing up diagrams or charts for a better organisation of the study	
Never	10 (9)
Sometimes	51 (45.5)
Constantly	30 (26.8)
Always	21 (18.7)
Completion of work within the proposed timeframe	
Never	2 (1.8)
Sometimes	38 (34)
Constantly	48 (43)
Always	24 (21.4)
Study ahead of time to achieve good results in scheduled exams	
Never	1 (0.9)
Sometimes	36 (32.1)
Constantly	56 (50)
Always	19 (17)
Consideration as to whether the form of study is adequate to perform well in an exam	
Never	2 (1.8)
Sometimes	41 (36.6)
Constantly	59 (52.6)
Always	10 (9)
Writing a summary when studying	
Never	5 (4.5)
Sometimes	40 (35.7)
Constantly	39 (35)
Always	28 (25)
Drawing concept maps when studying	
Never	17 (15.1)
Sometimes	48 (43)
Constantly	34 (30.3)
Always	13 (11.6)

Table 4. Memorisation section

n = 112	n (%)
Conducting a general assessment before concentrating on the study	
Never	11 (10)
Sometimes	38 (34)
Constantly	55 (49.1)
Always	8 (7.1)
Drafting of important data that are difficult to memorise	
Never	3 (2.7)
Sometimes	17 (15.1)
Constantly	56 (50)
Always	36 (32.1)
Mental summary of what you are studying	
Never	2 (1.8)
Sometimes	20 (18)
Constantly	62 (55.3)
Always	28 (25)
Memorisation of the most important parts of your reading	
Never	4 (3.6)
Sometimes	24 (21.4)
Constantly	50 (44.6)
Always	34 (30.3)
Use of mnemonic techniques to facilitate memorisation of the subject being studied	
Never	11 (9.8)
Sometimes	43 (38.3)
Constantly	40 (35.7)
Always	18 (16)
Actual memorisation of the important information on each topic	
Never	3 (2.6)
Sometimes	28 (25)
Constantly	68 (60.7)
Always	13 (11.6)
Importance of drawing charts, schematics, diagrams and other resources for the improvement of the memorisation process	
Never	8 (7.1)
Sometimes	35 (31.2)
Constantly	41 (36.6)
Always	28 (25)
Association of texts that are difficult to memorise with everyday subjects in order to achieve better results	
Never	9 (8)
Sometimes	36 (32.1)
Constantly	42 (37.5)
Always	25 (22.3)
The resident pays more attention in class in order to remember topics that are more relevant	
Never	2 (1.8)
Sometimes	13 (11.6)
Constantly	66 (59)
Always	31 (27.7)

academic performance, regardless of marital status. However, they have been found to influence consistent motivation. We found that the factors that influence OT

Table 5. Learning tools section

n = 112	n (%)
Daily and regular class attendance with a willingness to learn	
Sometimes	7 (6.2)
Constantly	50 (44.6)
Always	55 (49.1)
Consideration of the teacher's previous pedagogical training in order to change the way classes are taught	
Never	4 (3.6)
Sometimes	22 (19.6)
Constantly	45 (40.1)
Always	41 (36.6)
Undertaking review studies before taking the exam	
Never	2 (1.8)
Sometimes	18 (16)
Constantly	46 (41)
Always	46 (41)
Study of the subject before attending class	
Sometimes	31 (27.6)
Constantly	60 (53.6)
Always	21 (18.7)
Doing homework as a learning process	
Never	3 (2.7)
Sometimes	13 (11.6)
Constantly	69 (61.6)
Always	27 (24.1)
"Copying and pasting" on assignments	
Never	31 (27.7)
Sometimes	70 (62.5)
Constantly	10 (9)
Always	1 (0.9)
Taking notes and doing exercises up to date and in order	
Never	4 (3.6)
Sometimes	25 (22.3)
Constantly	66 (59)
Always	17 (15.1)
Active participation in class and fulfilment of your role as a student	
Never	1 (0.9)
Sometimes	31 (27.7)
Constantly	66 (59)
Always	14 (12.5)
Follow the teacher's explanations, by taking an active interest and asking questions	
Never	1 (0.9)
Sometimes	24 (21.4)
Constantly	72 (64.3)
Always	15 (13.4)
Time management in order to be able to study and achieve better results	
Never	1 (0.9)
Sometimes	32 (28.6)
Constantly	64 (57.1)
Always	15 (13.4)
Intense work to improve understanding of the content	
Sometimes	25 (22.3)
Constantly	71 (63.4)
Always	16 (14.2)
Working in a team with other colleagues helps you to achieve your personal learning goals	
Never	3 (2.7)
Constantly	63 (56.2)
Always	46 (41)
Preferable to be in the classroom where one can listen better and have more attention	
Never	1 (0.9)
Sometimes	10 (8.9)
Constantly	57 (51)
Always	44 (39.2)
Necessary complementary material to study properly	
Never	1 (0.9)
Sometimes	20 (18)
Constantly	55 (49.1)
Always	36 (32.1)
Study what has been explained and have a creative and critical attitude	
Never	1 (0.9)
Sometimes	11 (9.8)
Constantly	73 (65.1)
Always	27 (24.1)
Consult other books in addition to the texts suggested by the teacher	
Sometimes	27 (24.1)
Constantly	56 (50)
Always	29 (25.8)
Make every effort to write your papers in a clear manner	
Sometimes	8 (7.1)
Constantly	65 (58)
Always	39 (34.8)
Carrying out compulsory activities in time	
Never	2 (1.8)
Sometimes	24 (21.4)
Constantly	63 (56.2)
Always	23 (20.5)

and MF residents are age and marital status, as they have a direct association with academic performance. We found that at the age of 32±3 years, in our population, there is an association with poorer performance compared to younger resident physicians; most residents at this age are already married and have one or more children.

Eighty-four point eight percent of the medical residents stated that the specialty they are studying is the one they chose, as reflected in the average obtained at ENARM, since most of them are above the general average. In the same section, there is a contrasting point, as an unsatisfactory part is expressed: only 33.6% of the residents think that the specialty they are

Table 6. Academic performance section

n = 112	n (%)
The financial situation of the resident does not allow for suitable academic performance	
Strongly disagree	28 (25)
Disagree	41 (36.6)
Agree	25 (22.3)
Totally agree	18 (16)
Study habits influence academic performance	
Strongly disagree	1 (0.9)
Disagree	5 (4.5)
Agree	62 (55.3)
Totally agree	44 (39.2)
Consideration that study time is insufficient to perform well in a test	
Strongly disagree	6 (5.3)
Disagree	37 (33)
Agree	51 (45.5)
Totally agree	18 (16)
Feeling capable of getting a good grade	
Strongly disagree	1 (0.9)
Disagree	9 (8)
Agree	40 (35.7)
Totally agree	62 (55.3)
Forgetting the subject when taking an exam, which affects academic performance	
Strongly disagree	18 (16)
Disagree	69 (61.6)
Agree	20 (17.8)
Totally agree	5 (4.5)
Constantly asking colleagues about the subject that will be assessed	
Strongly disagree	14 (12.5)
Disagree	49 (43.7)
Agree	45 (40.1)
Totally agree	4 (3.6)
Perception that one is studying hard, but grades are not quite good	
Strongly disagree	17 (15.1)
Disagree	58 (51.7)
Agree	30 (26.8)
Totally agree	7 (6.2)
Thoughts that one performs better when there is teamwork	
Strongly disagree	5 (4.5)
Disagree	51 (45.5)
Agree	45 (40.1)
Totally agree	11 (9.8)
Connection between the time spent studying and grades obtained	
Strongly disagree	2 (1.8)
Disagree	17 (15.1)
Agree	76 (67.8)
Totally agree	17 (15.1)
The study methodology is adequate for subsequent good performance in a test and considerations on whether grades could be better	
Strongly disagree	1 (0.9)
Disagree	5 (4.5)
Agree	92 (82.1)
Totally agree	14 (12.5)
Learning time is worth living intensely	
Disagree	17 (15.1)
Agree	82 (73.2)
Totally agree	13 (11.6)

(Continues)

Table 6. Learning tools section *(continued)*

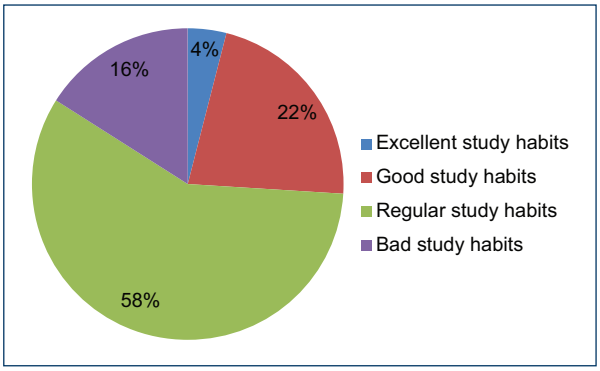

Figure 1. General study habits of FM and OT residents.

studying matches their expectations. To a large degree, in this answer given by FM residents and reinforced by data provided by authors such as Sevillano[21], it is mentioned that they often opt for this specialty as a second option without giving it the importance it deserves, which explains why these residents show signs of dissatisfaction.

In the section on study habits, it is worth noting that study time is on average one hour. This does not mean that it is a direct aspect that can be linked to academic performance. Because of the external factors surrounding it, such as the quality of the study and the attention given thereto, as attention is the focus of one's conscious mind in a sustained way on a certain activity or object that allows a clear reflection thereof[22].

Likewise, Ortega[23] argues that poor academic performance occurs when students do not organise their time, do not develop study plans and do not have the appropriate methodology and study technique.

Therefore, success in studies becomes multifactorial and does not depend directly on intelligence and effort, but also on effective study habits, as the development of academic skills leads to real study and optimal academic results.

It was observed that residents developed regular study habits (58%), and that the most important habit was memorisation. This makes a lot of sense since

having taken and passed the ENARM exam and staying in a medical residency requires adequate knowledge acquired in order to put it into practice and to show good academic performance[24].

According to the results obtained and the relationship with academic performance (average of the ENARM exam and residency), it was found that there is a direct correlation between the resident physician's marital status and academic performance. The presence or absence of children did not affect their study skills and, consequently, their academic performance.

We also assessed whether during residency there was an intention to quit, and found responses indicating that they either had never thought of quitting from the specialty (n = 77, 69%) or sometimes (n = 35, 31%).

It has often been observed that when some residents over the age of 30 take the ENARM exam it is their second time round and have difficulty passing it and entering a medical specialty that requires a higher than average score. Therefore, their last option is FM, as the entry score is lower than other specialties. Therefore, many residents choose to take the FM exam as it is their last option to enter the medical specialty. This is also reflected in the answer to the question whether they have ever thought of dropping out of their residency: The answer is "never".

In the case of the FM residents, the reason for dropping out for most of them was that it was not their first choice of specialty. When asked if the specialty they were currently studying was the one they wanted to pursue, 17 medical residents answered that it was not their first choice. Among the causes described in the literature in relation to the present survey, it was observed that those of a family nature[17,21] were the most influential on family doctors. In the present study, 6 FM residents were married with children, and this factor partially influences their academic performance, as it is multifactorial.

The dropout rate in the OT specialty is minimal. In the analysis of those residents who responded that they had ever thought of dropping out, the factors that could be inferred were work and family, although this was not directly considered in this study, which could be seen as one of the weaknesses of this research. This could be the basis for a further study to determine the factors that influence their pursuit of OT and FM residency[25].

Among the strengths of the study is that it correlates a surgical specialty with a clinical specialty, with a sufficient sample of medical residents.

As for weaknesses, there was no contrast with other medical and surgical specialties, where most residents make their first choice to enter a medical residency. This contrasts with one specialty (FM) that was not their first choice of entry and relates to residents who have taken the ENARM exam several times, so there is a selection bias and a manoeuvre bias.

We intended to conduct a multicentre study of all medical residency training sites in the state and outside the state of Puebla. The extension of the sample size and the analysis of other factors such as family, economic and social factors that can influence academic performance in a surgical specialty as well as clinical specialty. In addition, an analysis of workload and care, as well as a purposive search for stress and anxiety, as these factors may also affect academic performance within the specialty. It would also be important to analyse the use of ICT access and academic infrastructure, as well as the time and educational training of teachers and clinical practice tutors in the medical practice of resident physicians.

We also propose a practice analysis and evaluation of knowledge transfer horizontally (resident to resident) and vertically (clinical practice tutor to residents).

Conclusion

Age and marital status have a direct correlation with academic performance, while gender, university of study and year of residence do not. It is worth highlighting that an association was found between both specialties and the development of different study habits, due to the fact that the focus of each specialty is different, which requires different study habits. In general, TO and FM residents have regular study habits.

In terms of satisfaction, most residents felt that they were doing the specialty that was their first choice. A smaller percentage considered that they did not choose the specialisation they had planned (FM); on the other hand, a large percentage indicated that sometimes this was what they expected.

In the study habits section, it was found that the study time was adequate. However, there were difficulties in concentrating during the study and in the distribution of the study time.

In the reading comprehension section, it was inferred that this is the most difficult study habit for the residents, as they found it difficult to understand and distinguish the main points of the topics they have read.

In the memorisation section, we observed that they presented problems in associating information with

everyday affairs and using mnemonic techniques to facilitate information. However, they again displayed mastery of learning strategies oriented towards this habit.

As far as learning tools are concerned, the classroom has been shown to complement medical training. A negative aspect found is that most of them copy and paste information in their homework, as they deem it unnecessary, and they do not look for other sources of information to enrich their knowledge.

In conclusion, knowledge of study habits is not the only factor predisposing to academic performance, as there are other factors, which have not been analysed in this research. We propose to carry out another study where a multifactorial analysis is considered, that includes academic, social, family, professional and economic factors, and especially purposive search for stress and anxiety, as well as a multicentre study where other clinical and surgical specialties are analysed and contrasted.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of people and animals. The authors declare that no experiments were carried out on humans or animals for this research.

Data confidentiality. The authors declare that no patient data appears in this article.

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References

1. Ramírez Arias JL, Rodríguez Weber FL. Entre la tradición y lo moderno, ¿un aprendizaje de la medicina más completo? Acta Médica Grup Ángeles. 2020;18(1):5–6.
2. Barajas-Ochoa A, Ramos-Remus C, Ramos-Gómez S, Barajas-Ochoa Z, Sánchez-González JM, Hernández-Ávila M, et al. Desempeño de las escuelas de medicina en México: resultados del Examen Nacional para Aspirantes a Residencias Médicas. Salud Publica Mex. 2019; 61(4):495.
3. Bedolla-Solano R. Programa educativo de técnicas y hábitos de estudio para lograr aprendizajes sustentables en estudiantes de nuevo ingreso al nivel superior. Rev Iberoam Educ. 2018;76(2):73–94.
4. Chávez E. IMSS Puebla, cuarto lugar nacional en ranking de delegaciones [Internet]. Contrastes de Puebla. 2018. p. 1–4. Available from: http://www.contrastesdepuebla.mx/imss-puebla-cuarto-lugar-nacional-en-ranking-de-delegaciones
5. Monroy González LA, Mendoza Hernández LE, Alarcon Acosta H. Uso de medios electrónicos como estrategia de enseñanza para generar un aprendizaje dinámico e interactivo. Edähi Boletín Científico Ciencias Soc y Humanidades del ICSHu. 2019;7(14):44–50.
6. IMCO. Las 10 carreras con mayor número de profesionistas [Internet]. Instituto Mexicano para la Competitividad AC. 2021. p. 1. Available from: www.imco.org/comparacarreras
7. Centeno ÁM, Martínez Carretero JM. Innovaciones, investigación y evidencias en educación médica: La colaboración EMBE (Educación Médica Basada en la mejor Evidencia). Rev la Fund Educ Médica. 2003;6(1):26.
8. Durante E. La enseñanza en el ambiente clínico: principios y métodos. Rev Docencia Univ. 2012;10:149–75.
9. Reyes RA, Ballagas JP, Machín LV, Morejón YL. Experience in adapting activities to the learning styles of postgraduate distance learning | Experiencia en la adaptación de actividades a los estilos de aprendizaje desde la educación de posgrado a distancia. Rev Cuba Educ Medica Super. 2017;31(2):1–14.
10. Méndez L. Practicum Psicología. La formación de profesionales en la enseñanza no presencial. Rev Latinoam Psicol. 2012;44(3):1–10.
11. Caraballo Yohama. Epidemiología de los trastornos músculo-esqueléticos de origen ocupacional. Temas Epidemiol y salud pública [Internet]. 2013;II:745–64. Available from: http://www.mundocupacional.com/descargas/articulos/Epidemiologia_trastornos_musculoesqueleticos_origen_ocupacional.pdf
12. Mondragón Albarrán CM, Cardoso Jiménez D, Bobadilla Beltrán S. Hábitos de estudio y rendimiento académico. Caso estudiantes de la licenciatura en Administración de la Unidad Académica Profesional Tejupilco, 2016/Study habits and academic performance: A research study of Business Administration undergraduate students at the Tejupilco Professional Academic Unit, 2016. RIDE Rev Iberoam para la Investig y el Desarro Educ. 2017;8(15):661–85.
13. Aberg KC, Doell KC, Schwartz S. Linking individual learning styles to approach-avoidance motivational traits and computational aspects of reinforcement learning. PLoS One. 2016;11(11):1–16.
14. Hidalgo-Vicario MI. La formación en medicina de los MILLENNIALS. Adolescere [Internet]. 2017;5(1):3–6. Available from: https://www.adolescenciasema.org/ficheros/REVISTA ADOLESCERE/vol5num1-2017/03-06 Editorial.pdf
15. Luc JGY, Antonoff MB. Active Learning in Medical Education: Application to the Training of Surgeons. J Med Educ Curric Dev. 2016;3:JMECD.S18929.
16. Brissette A. Motivation In Medical Education : A Systematic Review Motivation In Medical Education : A Systematic Review Abstract. Webmed-Central Med Educ [Internet]. 2010;1(12):WMC001261. Available from: http://www.webmedcentral.com/article_view/1261
17. Vázquez Martínez FD. La teoría de la evolución educativa y la formación de médicos especialistas. Investig en Educ Médica [Internet]. 2016;5(18):121–7. Available from: http://dx.doi.org/10.1016/j.riem.2015.10.003
18. Chiu YC, Liang JC, Hsu HY, Chu TS, Lin KH, Chen YY, et al. To examine the associations between medical students' conceptions of learning, strategies to learning, and learning outcome in a medical humanities course. BMC Med Educ. 2019;19(1):1–14.
19. García-Jiménez EP, Rojas-Pérez EM, Ruiz-Ruisánchez A. Técnicas de estudio para mejorar el aprendizaje en la residencia médica. Rev Mex Anestesiol. 2012;35(SUPPL1):242–4.
20. González Mariño MA. Factores que influyen en el rendimiento académico de residentes de Obstetricia y Ginecología de una universidad en Bogotá, Colombia. Rev UDCA Actual Divulg Científica. 2019;22(2):e1377.
21. Sevillano EG. No quiero ser médico de familia. El País [Internet]. 2010;850125. Available from: elpais.com/diario/2010/06/07/sociedad/1275861601_850215.htlm
22. Palomino-Gómez J. Compresión lectora y rendimiento escolar: una ruta para mejorar la comunicación. COMUNI@CCION Rev Investig en Comun y Desarro [Internet]. 2011;2(2):27–36. Available from: http://www.redalyc.org/articulo.oa?id=449845038003
23. Ortega Molio V. Hábitos De Estudio Y Rendimiento Académico En Estudiantes De Segundo De Secundaria De Una Institución Educativa Del Callao. Univ San Ignacio Loyola [Internet]. 2015;43. Available from: http://200.37.102.150/bitstream/123456789/1215/1/2012_Ortega_Hábitos de estudio y rendimiento académico en estudiantes de segundo de secundaria de una institución educativa del Callao.pdf
24. Akaki Blancas JL, López Bárcena J. Specialist medical training in Mexico. Educ Medica [Internet]. 2018;19(xx):36–42. Available from: https://doi.org/10.1016/j.edumed.2018.03.007
25. Manterola-Álvarez D. Factores socioeconómicos y psicoafectivos y su influencia en el rendimiento académico de los residentes de Ginecología y Obstetricia. Ginecol Obstet Mex. 2015;83(3):139–47.

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ORIGINAL ARTICLE

Moderate hypofractionation in prostate cancer: experience from Regional Hospital ISSSTE, Morelos

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Abstract

Purpose: *To describe the institutional experience of treatment with volumetric modulated arc therapy (VMAT) in prostate cancer in the Mexican population of the Regional Hospital "Centenario de la Revolución Mexicana", ISSSTE, Morelos.* **Methods:** *A retrospective study of patients with prostate cancer treated with radiotherapy with moderate hypofractionation at doses of 70.2Gy in 26 fractions was performed, between January 2017 and January 2021.* **Results:** *55 patients were included in the analysis, with a median follow-up of 20.7 months, biochemical control was 100%. Acute gastrointestinal toxicity grade 1 or less occurred in 87.3% of patients, grade 2: 9.1% y grade 3 in 3.6%; acute genitourinary toxicity grade 1 or less in 90.9%, grade 2: 7.3% and grade 3: 1.8%. Regarding chronic gastrointestinal toxicity grade 1 or less, it was 95.3%, grade 2: 4.8%, There have been no grade 3 or higher cases, chronic genitourinary toxicity grade 1 or less 90.5%, grade 2: 7.1%, grade 3: 2.4%.* **Conclusions:** *Moderate hypofractionation in prostate cancer in the Mexican population presents excellent biochemical control and an adequate toxicity profile.*

Keywords: *Hypofractionation. Cancer. Prostate. Mexico.*

Introduction

In 2020, prostate cancer ranked fourth in the world in terms of incidence among all malignant neoplasms, with 1,414,259 cases and a rate of 30.7 cases per 100,000 inhabitants, the absolute number of deaths in the world reported in the same year was 466,003 patients with an adjusted mortality rate of 7.7. In Mexico, the rate was 10.6, with 90,222 deaths; the incidence was 195,499 cases with a rate of 42.24[1], which represents a public health problem in our country. Prostate cancer has particular biological features compared to other types of malignant tumours. Its growth is slow and clinically silent, sometimes not very aggressive, which makes it a tumour with a high prevalence and relatively low mortality. In radiation therapy, we classify them into low, intermediate and high-risk groups based on three parameters: prostate-specific antigen level, Gleason score and extent of disease in the pelvis. Histologically speaking, more than 90% of prostate malignant tumours correspond to acinar adenocarcinomas, the vast majority originate from the peripheral zone of the prostate and generally have an orderly behaviour. The main site of metastasis is the bone with a predilection for the axial skeleton.

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An adequate screening programme, combined with safe and effective treatment, allows patients to enjoy an excellent local control rate and a good quality of life. The demand for radiotherapy services for prostate cancer has increased significantly, in parallel with technological advances. Radiotherapy has proven to be a safe and effective treatment for prostate cancer.

Background

Radiotherapy has long been the mainstay of radical treatment for prostate cancer patients, with results comparable to those of radical prostatectomy, but with less morbidity. Pioneering radiotherapy studies[2] gave doses of 64-70 Gy in conventional fractionation (1.8-2 Gy per session) with conflicting results and high biochemical failure rates. Subsequently, dose escalation studies[3] were initiated, with favourable results and high local control rates, but with increased acute and chronic toxicity due to the use of three-dimensional (3D) conformal technology. The main toxicity of radiotherapy is in the bladder (cystitis) and rectum (proctitis) and we classify it as acute and chronic depending on the time of onset. In general, acute toxicity is considered to be that which occurs during treatment and up to 6 months after the end of treatment, and chronic toxicity occurs 6 months after the end of treatment. Thus, we have acute and chronic post-radiation cystitis and post-radiation proctitis. There are different scales for assessing toxicity, the main one being that of the Radiation Oncology Education Collaborative Study Group in the US and Europe. Currently, according to international guidelines[4], the standard treatment requires doses above 78 Gy in conventional fractionation, with sessions from Monday to Friday for 8 weeks. Technological advances in intensity-modulated radiation therapy (IMRT) and its dynamic variants such as volumetric intensity-modulated arc therapy (VMAT), as well as image-guided radiation therapy (IGRT), have made it possible to offer more precise treatments with less morbidity. Because the number of prostate tumour cells have decreased[5], studies have been initiated over the past decade to evaluate the efficacy and safety of moderate hypofractionation (doses of 2.5-4 Gy per session), and we now have mature data indicating that moderate hypofractionation is equivalent to conventional fractionation, with the advantage that it can be administered in 5 weeks or less. Meta-analysis studies[6] show even better biochemical and clinical control rates, with conflicting results for acute toxicity, but with less chronic toxicity compared to conventional fractionation. Maximum androgen blockade is currently used in intermediate and high risk tumours and consists of the complete suppression of testosterone production (biochemical castration); this treatment is not considered a radical treatment, so it is not sufficient to treat patients with this treatment modality alone; it is a co-adjuvant treatment to radical treatments (surgery or radiotherapy).

Since 1 January 2017, the radiotherapy department of the Hospital Regional de Alta Especialidad (HRAE) "Centenario de la Revolución Mexicana" ISSSTE Morelos began the protocol of moderate hypofractionation in prostate cancer, administering total doses of 70. 2 Gy in 26 fractions, 2.7 Gy per fraction with VMAT, IGRT and concomitant incremental technique for elective pelvic lymph node irradiation, based on the results and fractionation of *Pollack*[7], which was performed in the Anglo-Saxon population. This is the first report with such a treatment scheme in a Mexican population.

Objective

To describe the institutional experience of treatment with moderate hypofractionation administered with intensity-modulated volumetric arc therapy in localised prostate cancer in the Mexican population of the HRAE "Centenario de la Revolución Mexicana", Morelos.

Material and methods

A retrospective analysis was performed on all patients diagnosed with prostate cancer at the HRAE from 1 January 2017 to 31 January 2021 treated with the radical-intent radiotherapy. The treatment plan was done according to the IMRT - VMAT modality and was administered on an Elekta linear accelerator with "Agility" multi-leaf collimator. 70.2 Gy were prescribed to the prostate and seminal vesicles (2. 7 Gy per session) with elective irradiation of 50 Gy to the pelvic lymph nodes according to the treating physician's criteria using Roach's formulas[8] to calculate the probability of lymph node involvement. A risk greater than or equal to 15% was considered significant. Both prescriptions were given with a concomitant augmentation technique in 26 sessions, Monday to Friday for 5.1 weeks. IGRT with real-time image fusion with cone beam CT was used 3 times a week, in virtual simulation and at each treatment session, all patients were prepared as follows: strict empty rectum and comfortably full bladder. The planning objectives were as follows: prescription dose at planning target volume (PTV) V100 > 95%, restriction doses for rectum were V43.9 < 50% and V65.79 < 15%

and for bladder V57.02 < 50% and V70.18 < 15%. In all plans, quality control was used with prior in vivo measurement with an arc check device. Maximum androgen blockade (MAB) was used at the discretion of the treating physician. The Phoenix consensus definition was used to determine biochemical failure, which is described as a prostate specific antigen (PSA) elevation of 2 ng/ml above the nadir achieved at follow-up[9].

Acute toxicity was defined as gastrointestinal and genitourinary side effects following radiotherapy treatment occurring during treatment and up to 6 months after the end of treatment and was measured using the RTOG/EORTC[10] scales, as was chronic toxicity, which was defined as gastrointestinal and genitourinary side effects after 6 months of treatment.

Results

Fifty-five patients fulfilled the inclusion criteria. Demographic, clinical and pathological characteristics are presented in Table 1. Mean follow-up was 20.7 months. The mean age at baseline was 68.9 years (56-85 years), the mean antigen level at baseline was 34 ng/ml (5.5-231 ng/ml), 9.1% were classified as low-risk, 29.1% as intermediate risk and 61.8% as high-risk according to the D'Amico risk classification[11]. As for the patients who received MAB, 34.5% received it < 24 months, 52.8% received it for 24 months, 9.1% received it > 24 months and 3.6% did not receive it. 74.5% of patients received elective pelvic lymph node irradiation. The mean PTV coverage was V100 = 97.1% (94.4% - 99.87%). The mean nadir PSA was 0.15 ng/ml (0 - 1.25 ng/ml), representing 100% biochemical control. The mean organ at risk dose for the rectum was V43.9 = 28.77%, V65.79 = 16.42% and for the bladder V57.02 = 25% and V70.18 = 17.9%. Acute gastrointestinal toxicity grade 1 or less occurred in 87.3% of patients, grade 2 in 9.1% and grade 3 in 3.6%. Acute genitourinary toxicity grade 1 or less in 90.9% of patients, grade 2 in 7.3% and grade 3 in 1.8%, (Fig. 1). For chronic gastrointestinal toxicity, grade 1 or lower 95.3%, grade 2: 4.8%, there were no cases of grade 3 or higher; for chronic genitourinary toxicity, grade 1 or lower 90.5%, grade 2: 7.1%, grade 3: 2.4%, (Fig. 2).

Table 1. Demographic, clinical and pathological characteristics

	n = 55	%
Age (years)	μ: 68.9 years	
50-59	5	9.1
60-69	24	43.6
70-79	24	43.6
80-89	2	3.7
TNM Classification		
T1	17	30.9
T2	29	52.7
T3	9	16.4
N0	52	94.5
N1	3	5.5
M	0	0
Gleason		
Group 1 (≤ 6)	13	23.6
Group 2 (3 + 4)	13	23.6
Group 3 (4 + 3)	5	9.1
Group 4 (8)	15	27.7
Group 5 (9,10)	9	16
Initial PSA (ng/ml)	μ: 34 ng/ml	
< 10	13	23.6
10-20	16	29.1
> 20	26	47.3
Risk group		
Low	5	9.1
Intermediate	16	29.1
High	34	61.8
MAB	μ: 20 months	
No blockage	2	3.6
< 24 months	19	34.5
24 months	29	52.8
> 24 months	5	9.1
Elective lymph node irradiation		
Yes	41	74.5
No	14	25.5

Discussion

Currently, there are no studies on moderate hypofractionation in prostate cancer with VMAT that analyse biochemical control and toxicity in the Mexican population. Our study is the first report with advanced radiotherapy techniques that corroborate the results obtained in the international literature, presenting an excellent biochemical control and an adequate toxicity profile. This could be explained by the fact that most patients were candidates for maximum androgen blockade and that a longer follow-up period is still needed. However, our results are encouraging in terms of the technique with which we administer the treatments and their quality controls.

Three large randomised controlled phase III studies, CHHiP, PROFIT and RTOG 0415[12-14], have shown that there is no inferiority in the use of radiotherapy with moderate hypofractionation techniques over conventional fractionation in all oncological variables. Thus, this treatment should be the standard in centres that have the technology for its implementation. Our study

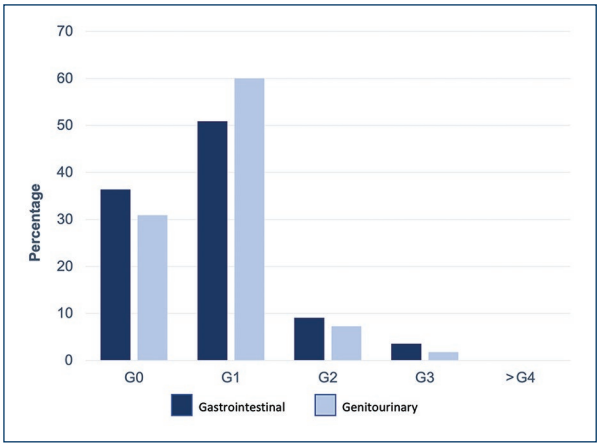

Figure 1. Acute toxicity grades according to RTOG/EORTC classification.

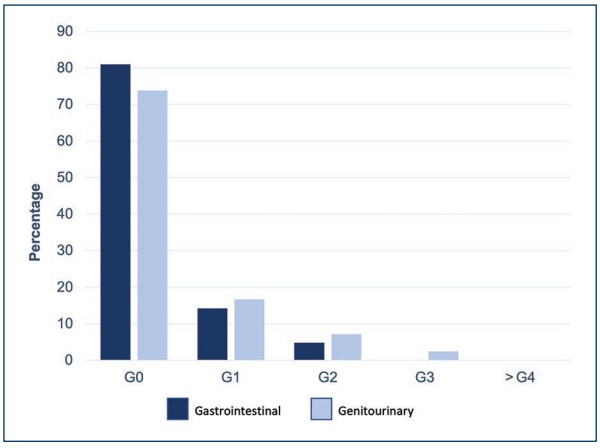

Figure 2. Degrees of chronic toxicity according to RTOG/EORTC classification.

found the same results in the Mexican population. The meta-analysis by Yin et al shows that biochemical control in even moderate hypofractionation is superior to conventional fractionation with an RR= 0.8, 95% CI: 0.68-0.95, p=0.009, which is in accordance with our results in biochemical control. The data for chronic gastrointestinal toxicity reported by Pollack et al were: grade 0: 28.2%, grade 1: 53.7%, grade 2: 16.1%; grade 3 or higher: 2%; and for genitourinary toxicity: grade 0: 3.4%, grade 1: 51.7%, grade 2: 40.9% and grade 3 or higher: 4%. These results are similar to those found in our study, with the exception of grades 0 and 1, which may reflect under-reporting of symptoms associated with sexual function. Due to the long natural history of prostate cancer, our study still needs to follow up patients more closely to verify that the biochemical monitoring data remains as high as reported and that the trend in chronic toxicity is the same as before.

In addition, our hypofractionation system has allowed us to treat more patients in less time by freeing up accelerator slots without compromising safety and efficacy.

Conclusions

Moderate hypofractionation in prostate cancer in the Mexican population of the HRAE "Centenario de la Revolución Mexicana" has excellent biochemical control and an adequate toxicity profile. This should be the standard treatment in centres with the technology for its implementation.

Our protocol reduces treatment time from 8 to 5.1 weeks, is more comfortable for patients and frees up slots on the linear accelerator, allowing our institution to treat more patients in less time, without compromising biochemical control and without increasing toxicity.

Funding

This study has not received specific aid from public sector organizations, the commercial sector, or non-profit entities.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of people and animals. The authors declare that no experiments were carried out on humans or animals for this research.

Data confidentiality. The authors declare that they have followed the protocols of their work center regarding the publication of patient data.

Right to privacy and informed consent. Right to privacy and informed consent. The authors have obtained the approval of the Ethics Committee for the analysis and publication of routinely obtained clinical data. The informed consent of the patients was not required as it was a retrospective observational study.

References

1. GLOBOCAN [Internet] 2021. Avaliable from: http://gco.iarc.fr/today.
2. Dearnaley D, Syndikus I, Mossop H, Khoo V, Birtle A, Bloomfield D, et al. Conventional versus hypofractionated high-dose intensity-modulated radiotherapy for prostate cancer: 5-year outcomes of the randomised, non-inferiority, phase 3 CHHiP trial. Lancet Oncol. 2016;17:1047-1060.

3. Kuban DA, Tucker SL, Dong L, Starkschall G, Huang EH, Cheung MR, et al. Long-term results of MD Anderson ramdomized dose-escalation trial for prostate cancer. Int J Radiat Oncol Biol Phys. 2008;70(1): 67-74.
4. NCCN Guidelines. [Internet] Prostate Cancer Version 1.2022. Available from: https://www.nccn.org/guidelines/guidelines-detail?category=1&id=1459.
5. Vogelius IR, Bentzen SM. Meta-analysis of the alpha/beta ratio for prostate cancer in the presence of an overal time factor: bad news, good news, or no news?. Int J Radiat Oncol Biol Phys. 2013;85(1): 89-94.
6. Yin Z, You J, Wang Y, Zhao J, Jiang S, Zhang X, et al. Moderate hypofractionated radiotherapy vs conventional fractionated radiotherapy in localized prostate cancer: a systemic review and meta-analysis from Phase III ramdomized trials. Onco Targets Ther. 2019;12:1259-1268.
7. Pollack A, Waker G, Horwitz EM, Price R, Feigenberg S, Konski AA, et al. Ramdomized trial of hypofractionated external-beam radiotherapy for prostate cancer. J Clin Oncol. 2013;(31):3860-3868.
8. Roach 3rd M, Marquez C, You HS, Narayan P, Coleman L, Nseyo UO, et al. Predicting the risk of lymph node involvement using the pre-treatment prostate specific antigen and Gleason score in men with clinically localized prostate cancer. Int J Radiat Oncol Biol Phys. 1994;28:33-37
9. Roach 3rd M, Hanks G, Thames Jr H, Schellhammer P, Shipley W, Sokol GH, et al. Defining biochemical failure following radiotherapy with or without hormonal therapy in men with clinically localized prostate cancer: recommendations of the RTOG-ASTRO Phoenix Consensus. Int J Radiat Oncol Biol Phys. 2006;65(4):965-974.
10. Cox JD, Stetz J, Pajak TF. Toxicity criteria of the Radiation Therapy Oncology Group (RTOG) and the European Organization for Research and Treatment of Cancer (EORTC). Int J Radiat Oncol Biol Phys. 1995;31(5):1341-1346.
11. D´Amico AV, Whittington R, Malkowicz SB, Schultz D, Blank K, Broderick GA, et al. Biochemical outcome after radical prostatectomy, external beam radiation therapy, or interstitial radiation therapy for clinically localized prostate cancer. JAMA. 1998;280(11):969-974.
12. Catton CN, Lukka H, Gu CS, Martin JM, Supiot S, Chung PWM, et al. Randomized trial of a hypofractionated radiation regimen for the treatment of localized prostate cancer. J Clin Oncol. 2017;35(17)1884-1890.
13. Lee WR, Dignam JJ, Amin MB, Bruner DW, Low D, Swanson GP, et al. Randomized phase III noninferiority study comparing two fractionation schedules in patients with low-risk prostate cancer. J Clin Oncol. 2016;34(20)2325-2332.
14. Dearnaley DP, Khoo VS, Norman AR, Meyer L, Nahum A, Tait D, et al. Comparison of radiation side-effects of conformal and conventional radiotherapy in prostate cancer: a randomised trial. Lancet. 1999;353:267-272.

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ORIGINAL ARTICLE

Concha bullosa and nasal septum by tomographic study; experience at the General Hospital of Mexico Eduardo Liceaga

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Abstract

Introduction: *Nasal septal deviation is defined as any bending of the septal contour observable on coronal computed tomography (CT) scans and is present in more than half of the population. Concha bullosa (CB) is defined as persistent pneumatisation of the middle turbinate. The purposes of this study are to identify its frequency, as well as its relationship with the deviation of the nasal septum in the population that attends the HGMEL and to propose a radiological classification according to its size and location in relation to the degree of turbinate obstruction.* **Method:** *Osteomeatal CT scans performed during one year (January-December 2020) were analysed. All cases presented deviation of the nasal septum. We use the Bolger and Calvo-Henriquez classifications and propose a classification according to the maximum size of the extension in the coronal plane (General Hospital of Mexico Eduardo Liceaga [HGMEL] Classification).* **Results:** *Of 142 CT scans of nasal sinuses, 99 were excluded because they did not present CB; as for the remaining 43 (30.28%) subject to this analysis, 27 corresponded to women (62.7%). The incidence of unilateral type CB was 65.12% and that of the bilateral type of 34.88%, with left unilateral CB in 57.14% of cases. The most frequent forms were type 2 (lamellar) with the Bolger classification, type I with the Calvo-Henríquez classification, and grade 1 according to the HGMEL classification.* **Conclusion:** *The proposed classification is based on the involvement of the middle turbinate caused by the deviation of the septum due to its anatomical and physiological importance. It is important as a surgical reference and can be easily studied on the preoperative CT scan.*

Keywords: *Concha bullosa. Septal deviation. Sinus tomography. Bolger Classification. Calvo-Henriquez Classification.*

Introduction

The nasal septum is a structure that provides physiological support to the nose and affects the intranasal airflow pattern[1-4]. A deviated nasal septum is any curvature of the septum contour and is identified on CT scans. According to various reports in the literature, this condition is found in up to half of the adult population[5-13]. Based on various evidence, trauma, particularly in childhood, is an important factor in the aetiology of septal deformity[6-11], while non-traumatic deviation of the septum may occur due to pressure and expansion during septal growth from the ossification centres[3-12].

The concha bullosa is the aeration (pneumatisation) of the vertical part of the middle turbinate[8,9,11,13,14]; this

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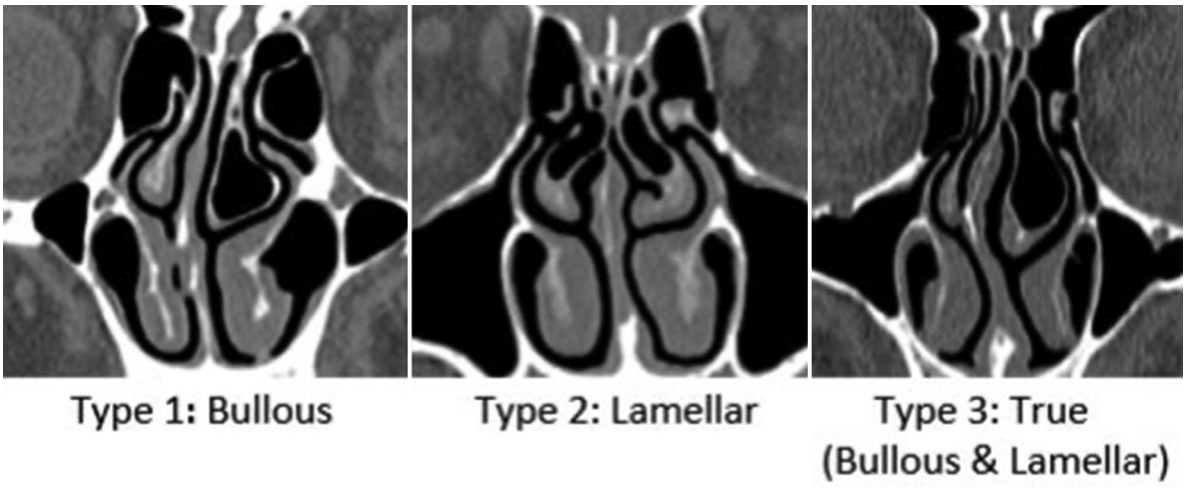

Figure 1. Coronal plane CT images showing the types of CB according to the classification by extent of pneumatisation in its different elements (Bolger).

anatomical variation occurs in 24% to 55% of the population[8-15]. The mechanism and origin of this pneumatisation are not yet well defined[8,9,11,13,14], although most authors suggest that it originates from the anterior ethmoidal sinus[12-15]. Two theories have been proposed: one postulates that the concha bullosa arises during compensatory changes in airflow caused by deviation of the nasal septum, while the second suggests that it is due to individual anatomical variations[12,13,15-17].

Unilateral concha bullosa has been associated with contralateral septal deviation and hypertrophy of the inferior turbinate and obstruction of the osteomeatal complex[8,9,12-17]. In most cases, the concha bullosa is considered a normal and asymptomatic anatomical variant, but it can lead to impaired ventilation or drainage when it reaches a larger size[8,12-15].

The objectives of this study are: (1) to identify the frequency of CB, (2) its relationship with the deviation of the nasal septum in the population attending the General Hospital of Mexico Eduardo Liceaga (HGMEL) and, (3) to propose a radiological classification according to its size and location in relation to the degree of turbinate obstruction (HGMEL Classification).

Materials and method

An observational and descriptive study was conducted in which 142 non-contrast osteomeatal complex CT scans performed during one year (January to December 2020) were analysed. All patients had only a deviated septum without other functional nasal obstruction, such as sinusitis or allergic rhinitis. Studies in persons under 18 years of age and those with significant distortion of the sinonasal anatomy (tumours, mucormycosis, and a history of facial fracture or post-operative sinonasal surgery) were excluded. Imaging studies were obtained using a 128-channel Somatom Definition AS CT scanner (Siemens®) with axial, coronal and sagittal reconstructions at each millimetre, all within a bone window. Nasal septal deviation was defined as any curvature of the septal contour identified on CT scans, and concha bullosa was defined as aeration of the middle turbinate in case of bilateral presentation; both sides were evaluated separately. Case images were extracted from the *Picture Archive and Communication System* (PACS) of the HGMEL.

We used the Bolger classification of concha bullosa (Fig. 1)[12], the Calvo-Henríquez classification by degree of pneumatisation of the middle turbinate body in the axial plane (Fig. 2)[13], as well as the application of the classifications proposed by the team of the head and neck tomography department of the HGMEL Radiology Services. They are based on the size of the CB, whose extension is measured in the coronal plane from its medial to lateral edge perpendicular to its axis (Fig. 3) and based on the degrees of septal deviation in the coronal plane (Fig. 4).

To identify the association between CB and septal deviation, we compared whether the presence of pneumatisation of the middle turbinate was on the convex or concave side of the septum in the axial and coronal planes. A positive association was determined

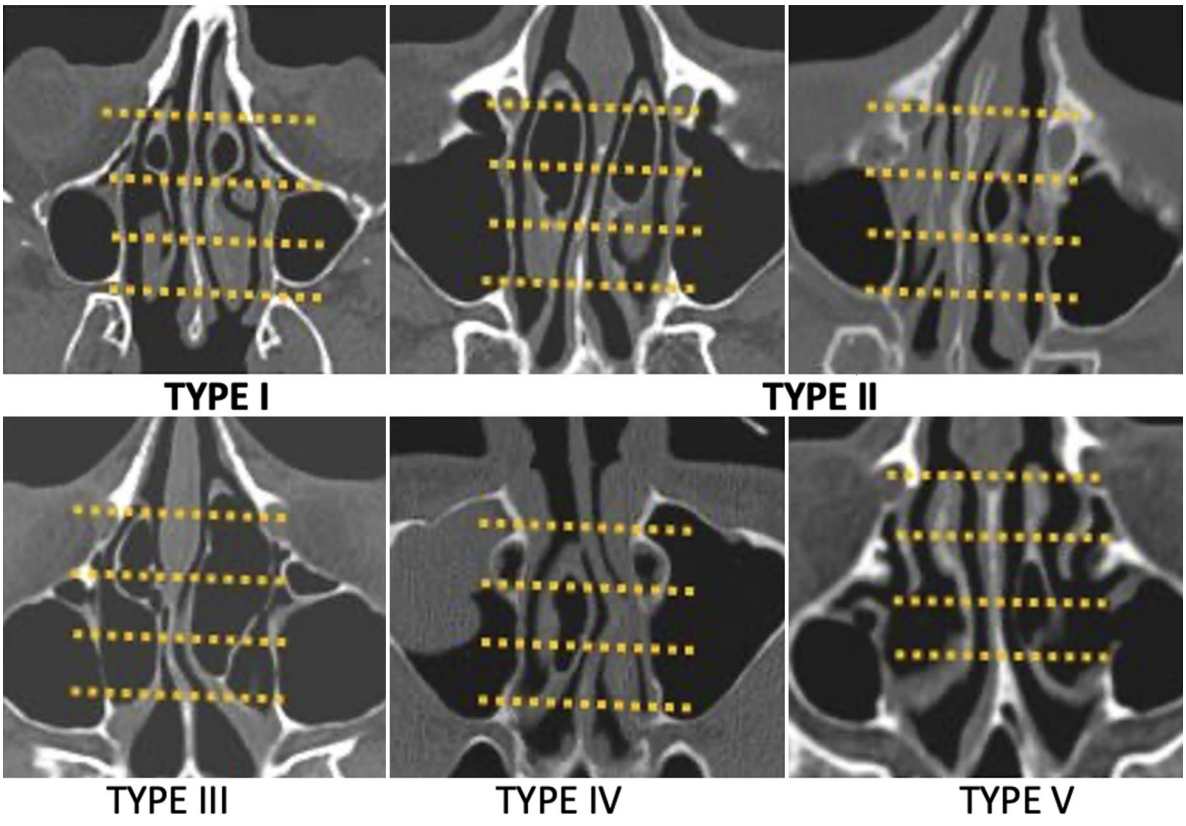

Figure 2. Axial CT scan images showing the types of CB according to the classification by extent of pneumatisation in the anteroposterior direction within the nasal cavities (Calvo-Henriquez). Type I in the anterior third of the turbinate, type II in two anterior thirds or in the middle third, type III complete anteroposterior, type IV two posterior thirds and type V in the posterior third.

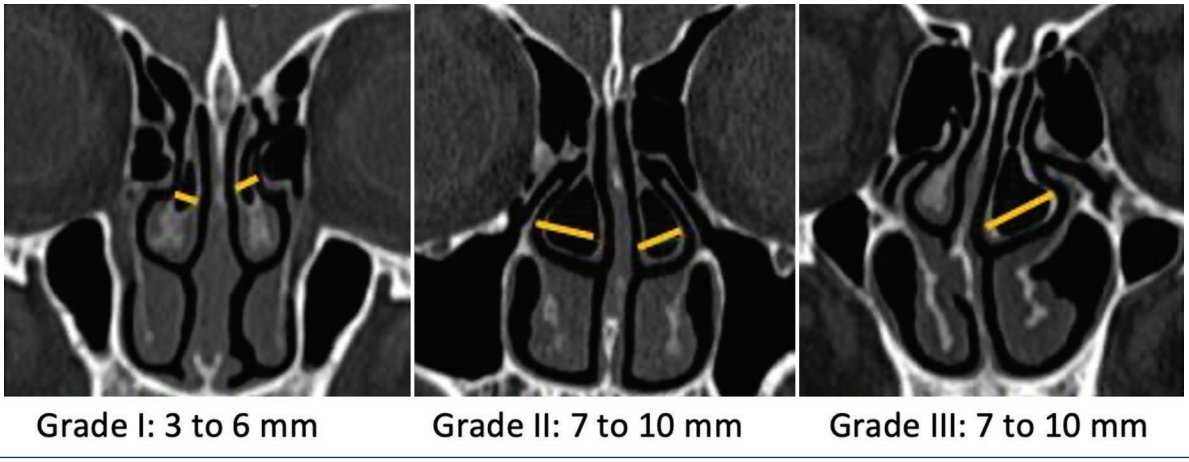

Figure 3. Coronal plane CT scan images showing CB types according to size (HGMEL).

when the CB was present on the concave side of the deviated septum and a negative association when the concha bullosa was on the convex side. In cases of bilateral pneumatisation of the middle turbinate, the largest CB was used to define its association with the septal deviation.

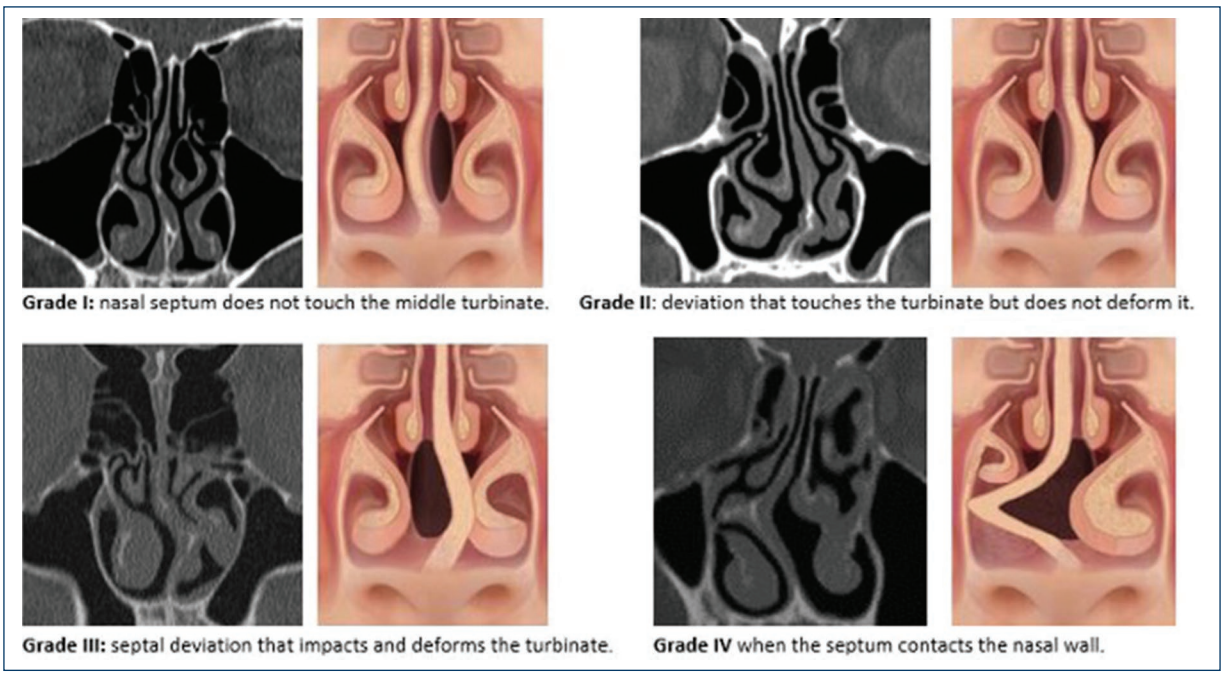

Figure 4. Coronal plane CT scan images with respective illustration showing the types of septal deviation according to the classification by degrees of obstruction over the middle turbinate (HGMEL).

Table 1. Incidence of concha bullosa by gender and location

	Right n (%)	Left n (%)	Bilateral n (%)
Women (27)	8 (29.63%)	10 (37.04%)	9 (33.33%)
Men (16)	4 (25.00%)	6 (37.50%)	6 (37.50%)
TOTAL (43)	12 (27.91%)	16 (37.21%)	15 (34.88%)

Results

Of the 142 sinonasal CT scans, 99 (69.72%) were excluded because they did not show CB, so the final sample size were 43 cases. Table 1 shows the general features of the cases and the location of the concha bullosa. Table 2 shows the results based on the three classifications. The most common side of the septal deviations was to the left in 58.13% of the cases and the remaining percentage corresponded to right deviations. According to the HGMEL classification, the most frequent septal deviation was type 1, followed by type 2, the least frequent being type 3. No type 4 septal deviation was observed in the present study.

In this analysis, we found a positive relationship between concha bullosa media and nasal septal deviation in 74.42% (32 studies) and a negative relationship between these entities in 25.5% (11 studies). Of the cases without this association, seven had a small lamellar CB and 3 had increased hypertrophy of the contralateral middle and inferior turbinate.

Table 2. Results for concha bullosa based on different classifications

Bolger classification	**n**	
Type 1		9.3
Type 2	25	58.14
Type 3		32.56
Calvo-Henriquez classification	**n**	**%**
Type I	21	48.84
Type II		39.53
Type III		9.3
Type IV	1	2.33
Type V	0	-
HGMEL classification	**n**	
Grade 1	23	53.49
Grade 2		32.56
Grade 3		13.95

HGMEL: Hospital General de México Eduardo Liceaga.

Larger CB size (grade 3) was associated with a larger contact area with the nasal septum. There was a direct relationship between the size of the concha bullosa and the degree of septal deviation (Fig. 5).

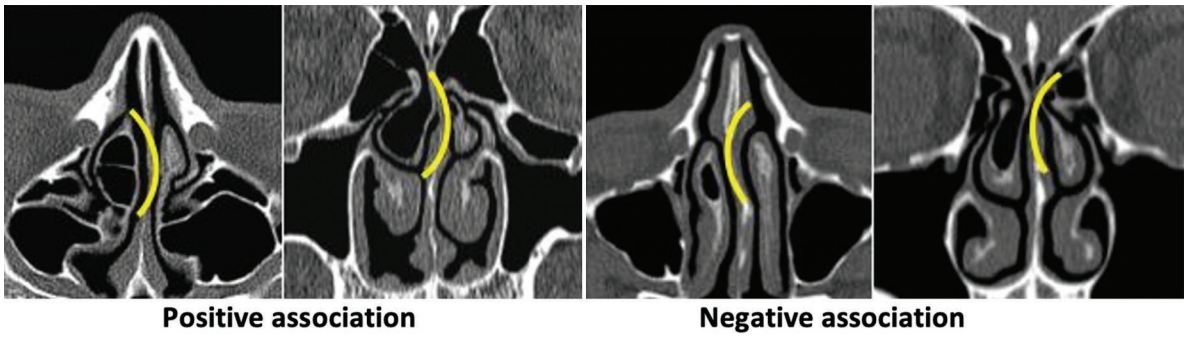

Figure 5. Axial and coronal CT scan images showing the positive and negative association between CB and septal deviation.

Discussion

Anatomical variants of the paranasal sinuses exist in the population worldwide[1-8]. In Mexico, we do not have data on this, thus in this study the overall incidence of CB was determined to be 30.2% using a simple bone window scan for the paranasal sinuses, data that coincide with those reported by Soo et al[8]. Nasal septal deviation was more common in females (62.7%), which is consistent with Mostafa et al[15].

To classify septal deviation, a morphological reference based on the position where the deviation occurs and its types (Mladina's classification)[14,18] is used, which is not practical as it does not provide data on function. This led us to propose and use our own classification (HGMEL classification) based on the degree of involvement of the middle turbinate caused by the deviation of the septum and its anatomical and physiological relevance. This is because there is a lot of information that mentions the massive importance of the air passage in the middle turbinate[4,5,12-15]; thus, applying this classification, we found that the most common septal deviation was type I, in which no significant obstruction is generated.

In our study, the turbinate location of the concha bullosa showed the highest incidence, suggesting that these patients present greater resistance to airflow, compared to the lamellar location, which anatomically does not restrict inhaled airflow, which coincides with the results of other authors[7,9,10,12-15,19]. Regarding the size of the CB, we found that the most common is grade 1 (3 mm to 6 mm). These are small and do not influence the components of nasal resistance, and only influence the deviation of the nasal septum[1,13], while the large ones (grade 3, 11 mm to 14 mm) have a larger surface area in contact with the septum and cause airflow resistance.

Based on this study, we also found that the maximum point of septal deviation is directly or concavely (positively) related to the presence and location of the CB, i.e. the angle of septal deviation, since when the septum deviates, it closes or decreases in front of the CB, as if it exerts pressure on the nasal septum.

Conclusions

Based on our results, we conclude that there is a direct association: the larger the concha bullosa, the greater the septal deviation, which supports our initial approach. It is not possible to determine whether the CB was formed by compensatory changes in airflow caused by the deviated septum, or whether the deviated septum was generated by the airflow resistance caused by the CB presence.

The radiologist should identify and report the anatomical variants of the paranasal sinuses (their location and size) in preoperative imaging studies, hence providing the most useful information to the surgeons for the development of their intervention.

The proposed classification (HGMEL) of septal deviation and concha bullosa size is more practical in quantifying the degree of obstruction, as there is an association between a larger concha bullosa and a larger nasal septal deviation.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of people and animals. The authors declare that no experiments were carried out on humans or animals for this research.

Data confidentiality. The authors declare that no patient data appears in this article.

Right to privacy and informed consent. The authors declare that no patient data appears in this article.

References

1. Polat C, Dostbil Z. Evaluation of the nasal mucociliary transport rate by rhinoscintigraphy before and after surgery in patients with deviated nasal septum. Eur Arch Otorhinolaryngol 2010;267:529-35.
2. Beale TJ, Madani G, Morley SJ. Imaging of the paranasal sinuses and nasal cavity: normal anatomy and clinically relevant anatomical variants. Semin Ultrasound CT MR 2009;30:2-16.
3. Pérez-Piñas I, Sabaté J, Carmona A, Catalina-Herrera CJ, Jiménez-Castellanos J. Anatomical variations in the human paranasal sinus region studied by CT. J Anat 2000;197:221-7.
4. Shpilberg KA, Daniel SC, Doshi AH, et al. CT of anatomic variants of the paranasal sinuses and nasal cavity: poor correlation with radiologically significant rhinosinusitis but importance in surgical planning. AJR Am J Roentgenol 2015;204:1255-60.
5. Aramani A, Karadi RN, Kumar S. A study of anatomical variations of osteomeatal complex in chronic rhinosinusitis patients-CT findings. J Clin Diagn Res 2014;8:KC01-KC04.
6. Wotman M, Kacker A. Should otolaryngologists pay more attention to nasal swell bodies? Laryngoscope 2015;125:1759-1760.
7. Yousem DM. Imaging of the sinonasal inflammatory disease. Radiology 1993;188:303-14.
8. Soo Kweon Koo, Jong Deok Kim, Ji Seung Moon, Sung Hoon Jung, Sang Hoon Lee. The incidence of concha bullosa, unusual anatomic variation and its relationship to nasal septal deviation: A retrospective radiologic study. Auris Nasus Larynx 2017;44:561-70
9. Stallman JS, Lobo JN, Som PM. The incidence of concha bullosa and its relationship to nasal septal deviation and paranasal sinus disease. AJNR Am J Neuroradiol 2004;25:1613-8.
10. Salihoglu M, Cekin E, Altundag A, Cesmeci E. Examination versus subjective nasal obstruction in the evaluation of the nasal septal deviation. Rhinology 2014;52:122-6.
11. Ahn JC, Kim JW, Lee CH, Rhee CS. Prevalence and risk factors of chronic rhinosinusitus, allergic rhintis, and nasal septal deviation: result of the Korean National Health and Nutrition Survey 2008-2012. JAMA Otolaryngol Head Neck Surg 2016;142:162-7.
12. Bolger WE, Butzin CA, Parsons DS. Paranasal sinus bony anatomic variations and mucosal abnormalities: CT analysis for endoscopic sinus surgery. Laryngoscope 1991;101:56-64.
13. Calvo-Henríquez C, Mota-Rojas X, Ruano-Ravina A. Concha bullosa. A radiological study and a new classification. Acta Otorrinolaringol Esp 2019;70:145-50.
14. Mariño-Sanchez F, Valls-Mateus M, Cardenas-Escalante P, Haag O, Ruiz-Echevarría K, Jiménez-Feijoo R, et al. Influence of nasal septum deformity on nasal obstruction, severity, and medical treatment response among children and adolescents with persistent allergic rhinitis: Int J Pediatric Otorhinolaryngol 2017;95:145e-154e.
15. Mostafa E, Waleed A, Mohamad H. Coincidence of Concha Bullosa with Nasal Septal Deviation; Radiological Study. Indian J Otolaryngol Head Neck Surg 2019;71(Suppl 3):S1918–S22
16. Bahar K, Kayhan Ö, Deniz Ü. Is There any Relationship Between Nasal Septal Deviation and Concha Bullosa. Eur J Gen Med 2010;7: 359-64.
17. Janovic N, Janovic A, Milicic B, Djuric M. Relationship between nasal septum morphology and nasal obstruction symptom severity: computed tomography study. Braz J Otorhinolaryngol. 2022;88:663-8.
18. Teixeira J, Certal V, Chang E, Camacho M. Nasal septal deviations: A systematic review of classification systems. Plastic Surg Int 2016:7089123.
19. Fadda GL, Rosso S, Aversa S, Petrelli A, Ondolo C, Succo G. Multiparametric statistical correlations between paranasal sinus anatomic variations and chronic rhinosinusitis. Acta Otorhinolaryngol Ital 2012; 32: pp. 244-251.

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CLINICAL CASES

Alternative methods of skull reconstruction for giant sarcomas

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Abstract

Soft tissue sarcomas are malignant tumors derived from the mesoderm, the most frequent age of presentation is between the 5th and 7th decade of life, mostly in males, more frequent location in the extremities, leaving only 1% of presentation in skin hairy, and this is a new concept of treating big sarcomas. We present the case of a 45-year-old male with a diagnosis of soft tissue sarcoma on the frontal, parietal, and right occipital surface of approximately 35x28x25 cm, without involvement of adjacent organs, without adjuvant therapy. Performing an oncological resection, exposing the periosteum, performing fenetrations of the external table, covering the Dermal Matrix – Integra®, using a new concept to treat this large defects, after 3 weeks with complete neodermis, we cover it with a Partial Thickness Graft, achieving 100% integration. and proper follow-up. Sarcomas are an uncommon and heterogeneous group of neoplasms of mesenchymal origin. Standard use of Integra reconstruction requires two stages: Integra forms a neo dermis through ingrowth of host vessels, followed by application of a thin split-thickness skin graft at a later date <30 days, using this new concepts of treating large defects with no flap. Sarcomas are highly aggressive and have very varied symptoms depending on the tumor stage at the time of diagnosis. Timely and improved a new concept of treatment such as an Integra® dermal regenerator, not using a flap, shows adequate integration in the patient and survival.

Keywords: *Dermal Matrix. Graft. Sarcoma.*

Introduction

Sarcomas are a rare and heterogeneous group of neoplasms of mesenchymal origin[1]. The clinical presentation of sarcoma is very varied. The main symptoms are rapid and gradual growth tumor that can be associated with pain in 50%; the pain is related to the compression effect[2,3].

The acellular dermal matrix (IntegraÒ) is composed of a laminated upper layer of Silastic, resembling epidermis, it is sufficient to control water loss and prevent the invasion of microbes. The lower layer has a highly porous structure and is composed of cross-linked coprecipitate of bovine collagen and chondroitin 6-sulfate, which is derived from shark cartilage[2,3]. In addition, the pore size design (20 to 125 um) of the dermal layer allows migration of endothelial cells and fibroblasts from the patient into the matrix[2]. Both layers serve as a matrix for the migration of fibroblasts, macrophages, lymphocytes, and capillaries derived from the wound[3,4].

Case report

The patient was a 45-year-old male, with not chronic-degenerative diseases. His condition began in January 2021, with growth of a temporary scalp tumor, with abrupt growth until it involved the frontal, parietal, and

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right occipital surface of approximately 35 x 28 x 25 cm, without compromise of adjacent organs and no therapy. Biopsy reports a high grade soft tissue sarcoma. A resection of the tumor was performed by the surgical oncology unit, with the final result of the surgical piece measuring 30 x 26 x 16.5 cm, it was a histological type of fibrosarcoma with periosteal exposure, performing external table fenestrations. A new management of Skin coverage to use and cover with dermal matrix, developing a complete neodermis after 21 days of regeneration, with review every 7 days was performed. As final skin coverage, a partial thickness graft is placed, achieving 100% integration (Figs. 1-4).

During the follow-up of the patient, with this innovative technique in patients with neoplasms, we done replacement of advanced absorbable silver dressings (Mepilex AG) on 3 occasions (every 7 days until day 21) prior to the last application, with application of graft (Figs. 5 and 6).

At day 21, the neodermis is assessed, the silicone layer of the dermal matrix is removed, achieving a 100% neodermis, partial thickness grafts of the Ollier - Thiersch type are taken, meshing it, proceeding to fixation of the graft covering the neodermis and the full thickness of the bloody area, which is covered with perforated silicone (mepitel One) and clip with advanced absorbable silver dressings (mepilex AG) achieving complete coverage and fixation of the grafted area. It is discovered after 7 days, assessing whether there is any complication and a minimum of exudate is observed (Figs. 7 and 8).

We proceed to remove the perforated silicone dressing; which, is maintained with adequate exudate, without compromise, observing a 100% integration with this new method applied and algorithm designed for the management in these patients. Therefore, at the follow-up for 1 month, complete and adequate integration is observed evolution, currently under follow-up by oncology to perform radiotherapy (Figs. 8-10).

Figure 1. 45-year-old male, with soft tissue sarcoma measuring 35x28x25 cm, in frontal view.

Figure 2. 45-year-old male, with soft tissue sarcoma measuring 35x28x25 cm, in basal view.

Discussion

Sarcomas represent 1% of malignant tumors in adults[2], affecting only 1 to 2 of every 500,000 people worldwide, with approximately 10,000 new cases per year in Mexico[3]. The mean age of patients with soft tissue sarcoma is 53.45 years for women and 55 years for men[4].

There are more than 70 histological types of sarcomas which vary in biological and clinical characteristics[4]. In general, they can be divided according to their

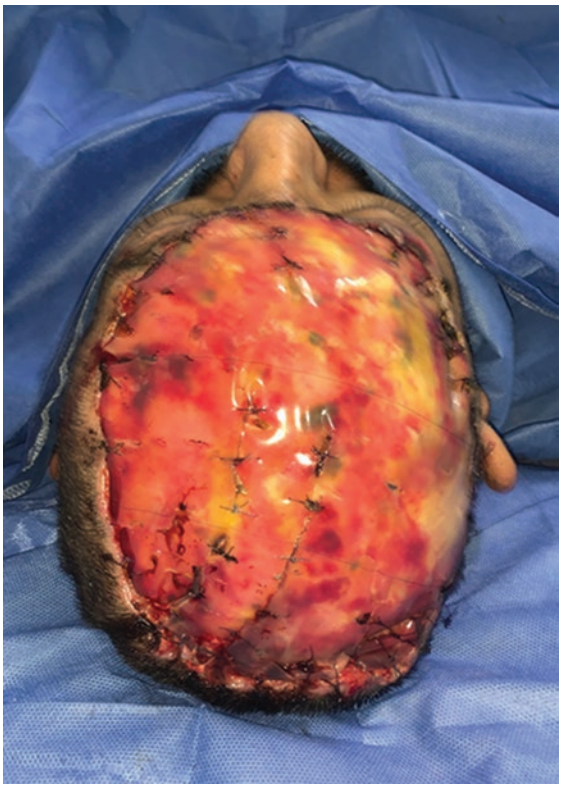

Figure 3. Placement of Acellular Dermal Matrix - Integra, top view.

Figure 4. Placement of Acellular Dermal Matrix - Integra, in its second replacement, front view, covering with mepilex AG.

origin, into soft tissue sarcomas and bone sarcomas[5]. The most common subtypes are pleomorphic sarcoma, gastrointestinal stromal tumor, liposarcoma, and leiomyosarcoma. The most common primary sites are extremities (43%), trunk (10%), viscera (19%), retroperitoneum (15%), and head and neck (9%). Generally, the most frequent site of metastasis is the lung, however, the affected area of metastasis depends to a great extent on the site where the primary tumor originated[4,5].

Approximately 90% of cases occur sporadically; in postpartum women there is a risk of genetic mutations (such as Li-Fraumeni syndrome, Neurofibromatosis of von Recklinghausen disease); as well as environmental risk factors such as ionizing radiation, radiotherapy or chemical exhibitors[4,5].

The clinical presentation of sarcoma is indistinct, because it presents a rapid and gradual tumor growth, which can cause pain. The size of the tumor can develop compression of attached structures and exacerbate pain[5].

Due to its low incidence and heterogeneity, the diagnosis is complicated and delayed, which directly affects the results of the assigned treatment. The presence of a tumor in the soft tissues should be treated by a specialized multidisciplinary team within referral centers as soon as a diagnosis of sarcoma is suspected[6,7]. Some essential elements for diagnosis are a complete clinical history, an adequate physical examination, imaging studies of the primary tumor and the identification of metastases, and biopsy (punch, incisional, or excisional)[6].

The treatment serves as a new therapeutic option, as well as a new alternative to the use of dermal matrices, when this combined with bloody areas due to neoplasia it improves survival. The primary strategy is based solely on surgical resection, although it has been shown that by adding radiotherapy can increase success rates. There are several approaches in which surgical resection can be managed: it can be marginal, extensive or radical, and the choice is made based on the level of malignancy previously analyzed. In many cases, especially when it comes to sarcomas in the extremities, surgeries with greater extension of margins are reserved for the last line of treatment because it is

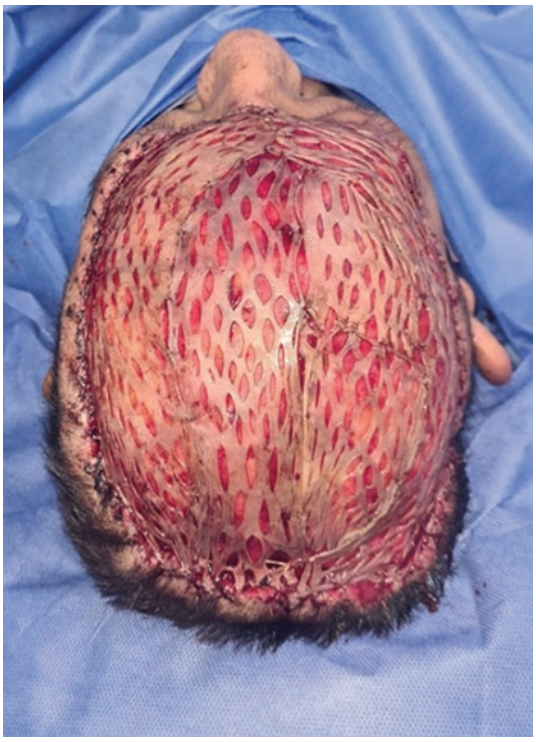

Figure 5. Partial thickness graft placement with neodermis surface top view.

Figure 7. Follow-up one month after graft integration, without recurrence and adequate evolution.

Figure 6. Partial thickness graft placement with neodermis surface, front view.

not only the resection of the tumor that matters, but also the function and quality of life of the patient[6]. Radiotherapy and chemotherapy (with the anthracycline-based regimen being the first line of treatment, followed by Gemcitabine and Pazopanib[6]-based treatments) can be used as forms of neoadjuvant treatment, for palliative purposes in case of severe metastases, or as control local growth[7].

In 1981, Burke and Yannas introduced the dermal regeneration template, it is an acellular matrix composed of two skin-like layers, which has currently been promoted as a use for survival in patients with multiple comorbidities. Current protocols (Fig. 11) describe how to use it with oncological and trauma management[8].

The top layer of the Silastic sheet is an epidermis-like structure, which is sufficient to control water loss and prevent microbial invasion. The lower layer has a highly porous structure and is composed of a cross-linked coprecipitate of bovine collagen and chondroitin 6-sulfate, which is derived from shark cartilage[9]. In addition, the pore size design (20 to 125 um) of the dermal layer allows migration of endothelial cells and fibroblasts

Figure 8. Follow-up at a month and a half with adequate integration and improvement of integration.

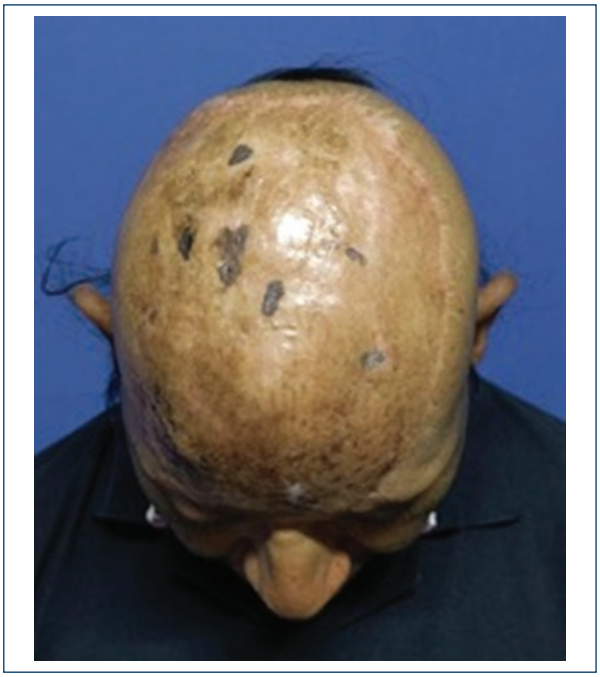

Figure 10. Follow-up at 6 months with adequate volume and esthetics, in the baseline image.

Figure 9. Follow-up at 6 months with adequate volume and aesthetics, in frontal image.

from the patient into the matrix[9]. Both layers serve as a matrix for the migration of fibroblasts, macrophages, lymphocytes, and capillaries derived from the wound[9,10].

The migration of these cells will replace this layer with the patient's own fibroblasts, a collagen network for the synthetic tissue to subsequently degrade. The matrix leads to the generation of a neodermis that is histologically very close to normal human dermis. The synthetic polysiloxane (silicone) polymer layer is a temporary layer that provides wound closure, relieves metabolic stress due to fluid and electrolyte losses, provides a barrier against microorganisms, and delays the need for autograft[10].

Initially, acellular dermal matrix was approved for use in acute burn injuries, but it has been used in a variety of pathologies including full-thickness acute burn wounds, burn scars, and the treatment of purpura fulminans[10]. Today, it is widely used in full-body reconstructive procedures, on painful or contracted scars, skin resurfacing, and coverage of full-thickness skin graft donor sites, however, this item has the tendency to develop and describe how this algorithm (Fig. 11) can be the best option as a surgical alternative for the management of bloody areas due to cancer and trauma[11].

The standard use of acellular dermal matrix reconstruction requires two steps: it forms a neodermis through ingrowth of the host's vessels, followed by the application of a thin, split-thickness skin graft at a later date of 14 to 21 days, in a current and innovative way that improves and describes the algorithm (Fig. 11)[12].

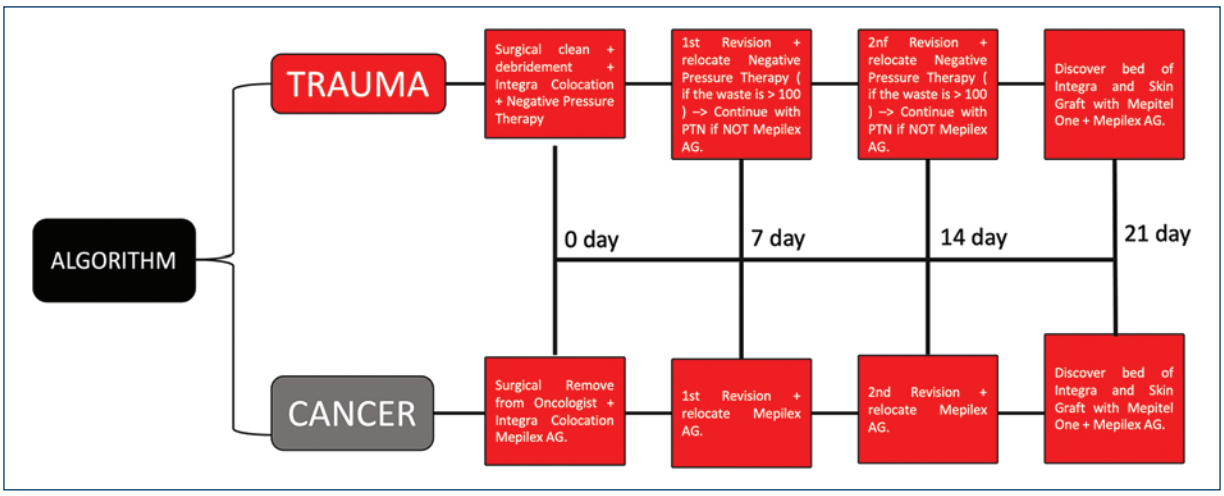

Figure 11. Standardized management of dermal matrix placement (Integra®). Explains how the dermal matrix is used in a new way to implement reconstruction due to cancer or trauma, according to a new established management.

There is a tendency to explore various ways of implementing single-stage acellular dermal matrix reconstructions where the matrix and graft are placed at the same time, but more research is needed. In general, the authors are of the opinion that a stepwise procedure (Fig. 11) should be used when possible, as it provides effective and durable results for all defect sizes[13].

Conclusion

Soft tissue sarcomas are malignantly distributed with rapid and gradual growth, showing clinical exacerbation depending on the tumor stage at the time of diagnosis. Timely innovative treatment, as in our case, can show an improvement in survival. A dermal matrix shows a new way to stimulate survival and clinical improvement without morbidity.

The case presented is a clear example of how to stimulate survival in patients with large-volume tumors involving skin and soft tissues. The management of an extensive bloody area in the scalp due to cancer gives us the initial guideline to establish a management algorithm in this type of patients (Fig. 11). Within our surgical practice, microsurgical flaps for full thickness coverage, such as the free-muscular latissimus dorsi flap or the omentum flap for this wide coverage, are viable options. However, in our patient, who due to the strong history of a low risk of survival (30 to 45% at 5 years) due to conclusive histological lineage, in addition to blood sequestration, this innovative treatment was a viable option.

This is a clinical case that shows an adequate multidisciplinary management and a medium-term survival which can be increased with the initiation of radiotherapy.

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Conflicts of interest

The authors declare that they have no conflict of interest.

Ethical disclosures

Protection of people and animals. The authors declare that no experiments were carried out on humans or animals for this research.

Data confidentiality. The authors declare that no patient data appears in this article.

Right to privacy and informed consent. The authors declare that no patient data appears in this article.

References

1. Bourcier K, Le Cesne A, Tselikas L, Adam J, Mir O, Honore C, de Baere T. Basic Knowledge in Soft Tissue Sarcoma. Cardiovasc Intervent Radiol. 2019 Sep;42(9):1255-1261. doi: 10.1007/s00270-019-02259-w. Epub 2019 Jun 24. PMID: 31236647. https://pubmed.ncbi.nlm.nih.gov/31236647/
2. Ray-Coquard I, Serre D, Reichardt P, Martín-Broto J, Bauer S. Options for treating different soft tissue sarcoma subtypes. Future Oncol. 2018 May;14(10s):25-49. doi: 10.2217/fon-2018-0076. PMID: 29768052. https://pubmed.ncbi.nlm.nih.gov/29768052/
3. von Mehren M, Kane JM, Bui MM, Choy E, Connelly M, Dry S, Ganjoo KN, George S, Gonzalez RJ, Heslin MJ, Homsi J, Keedy V, Kelly CM, Kim E, Liebner D, McCarter M, McGarry SV, Meyer C, Pappo AS, Parkes AM, Paz IB, Petersen IA, Poppe M, Riedel RF, Rubin B, Schuetze S, Shabason J, Sicklick JK, Spraker MB, Zimel M, Bergman MA, George GV. NCCN Guidelines Insights: Soft Tissue Sarcoma, Version 1.2021. J Natl Compr Canc Netw. 2020 Dec 2;18(12):1604-1612. doi: 10.6004/jnccn.2020.0058. PMID: 33285515.
4. von Mehren M, Randall RL, Benjamin RS, Boles S, Bui MM, Ganjoo KN, George S, Gonzalez RJ, Heslin MJ, Kane JM, Keedy V, Kim E, Koon H, Mayerson J, McCarter M, McGarry SV, Meyer C, Morris ZS, O'Donnell RJ, Pappo AS, Paz IB, Petersen IA, Pfeifer JD, Riedel RF, Ruo B, Schuetze S, Tap WD, Wayne JD, Bergman MA, Scavone JL. Soft Tissue Sarcoma, Version 2.2018, NCCN Clinical Practice Guidelines in Oncology. J Natl Compr Canc Netw. 2018 May;16(5):536-563. doi: 10.6004/jnccn.2018.0025. PMID: 29752328.
5. Cates JMM. Staging soft tissue sarcoma of the head and neck: Evaluation of the AJCC 8th edition revised T classifications. Head Neck. 2019 Jul;41(7):2359-2366. doi: 10.1002/hed.25701. Epub 2019 Feb 19. PMID: 30779403.
6. García, G et al. Manual de Oncología, procedimientos médico quirúrgicos. 2010 (4): 931-971. Instituto Nacional de Cancerología.
7. Axel Le et al. Current treatment patterns in advanced soft tissue sarcoma: real-world evidence of over 5,000 European patients. Cancer & Chemotherapy Rev. 2020;15(1): 45-54.
8. Moiemen NS, Staiano JJ, Ojeh NO, Thway Y, Frame JD. Reconstructive surgery with a dermal regeneration template: clinical and histologic study. Plast Reconstr Surg. 2001 Jul;108(1):93-103. doi: 10.1097/00006534-200107000-00015. PMID: 11420509.
9. Chou TD, Chen SL, Lee TW, Chen SG, Cheng TY, Lee CH, Chen TM, Wang HJ. Reconstruction of burn scar of the upper extremities with artificial skin. Plast Reconstr Surg. 2001 Aug;108(2):378-84: discussion 385. doi: 10.1097/00006534-200108000-00015. PMID: 11496178.
10. Abai B, Thayer D, Glat PM. The use of a dermal regeneration template (Integra) for acute resurfacing and reconstruction of defects created by excision of giant hairy nevi. Plast Reconstr Surg. 2004 Jul;114(1):162-8. doi: 10.1097/01.prs.0000129078.41960.92. PMID: 15220586.
11. Palao R, Gómez P, Huguet P. Burned breast reconstructive surgery with Integra dermal regeneration template. Br J Plast Surg. 2003 Apr;56(3):252-9. doi: 10.1016/s0007-1226(03)00101-2. PMID: 12859921.
12. Johnson MB, Wong AK. Integra-based Reconstruction of Large Scalp Wounds: A Case Report and Systematic Review of the Literature. Plast Reconstr Surg Glob Open. 2016 Oct 24;4(10):e1074. doi: 10.1097/GOX.0000000000001074. PMID: 27826471; PMCID: PMC5096526.

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CLINICAL CASES

Therapeutic description of common iliac artery aneurysms. Number of cases

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Abstract

Common iliac artery aneurysms (CAIA) are rare. The main etiology is atherosclerosis, while other reports include origins as diverse as pregnancy, infection, and iatrogenic trauma. We present a series of cases of common iliac aneurysm with risk of imminent rupture. We show the therapeutic approach through the open or endovascular surgery technique, obtaining good results. Of the patients admitted with the diagnosis of common iliac artery aneurysm, a review of the cases operated on in the angiology service was carried out on January 1, 2018 and April 30, 2022. An analysis of three patients is presented on the etiologies, the diagnosis and treatment. Three patients with the presence of AAIC treated in the service were identified, of which 2 males and 1 female, average age 50 years, smoking was present in 66% of the cases, open surgical treatment 1 case due to complex anatomy and 2 Endovascular technique. The discharge was earlier with the Endovascular therapy with less hospital time, although in one case Endovascular presented arterial rupture, in the 3 cases the closure of the aneurysmal sac was achieved without complications at discharge with good evolution. AAIC are present in a very low percentage, which is why they should be sought in patients with a history of smoking, abdominal trauma, and atherosclerosis. The diagnostic method of choice to define the anatomical characteristics is CT angiography with reconstruction 3, which helps us determine the diameter and extension of the aneurysm to plan the best treatment, as well as its relationship with important structures of the pelvic cavity that must be considered, such as the artery external iliac (hypogastric), colon and ureter. They must be treated because rupture is associated with high mortality, proper planning determines the success of treatment.

Keywords: *Common iliac artery aneurysm. Endovascular repair. Aneurysm abdominal.*

Introduction

Isolated iliac artery aneurysms comprise less than 2% of abdominal aneurysms and affect 0.3-0-6% of the general population. The internal iliac artery is affected in 10 to 30% of cases and the aneurysm is bilateral in half of the cases. Iliac aneurysms are associated with abdominal aortic aneurysm in 20% to 30% of cases.

Etiologic factors include trauma, vasculitis, pregnancy, infections, connective tissue disease, and iatrogenesis. Most of the AAIC are asymptomatic and the diagnosis is difficult. They can manifest with pulsating masses, abdominal or lower back pain (acute, caused by expansion or rupture, or chronic due to compression of nerves and organs), urinary symptoms (54%), gastrointestinal symptoms (constipation, tenesmus, pain on rectal examination and bleeding intestinal) and neurological symptoms and thromboembolism caused by compression of the femoral iliac venous system. In most cases patients are asymptomatic unless a rupture occurs. It can be diagnosed by Doppler ultrasound, magnetic resonance or, preferably, angiotomography. Diameters greater than 3 cm and symptomatic cases are an indication for surgery[1].

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Table 1. History of patients with common iliac artery aneurysm

Patient	Age (years)	Gender	Smoking	Diabetes mellitus	Previous abdominal surgery
1	72	Female	+	-	+
2	64	Male	+	+	+
3	45	Malesculino	-	-	-

Methods

A review of the number of patients with abdominal aortic aneurysm was carried out with the intention of searching only for iliac artery aneurysms, between January 1, 2018 and April 30, 2022. According to the literature, the most important factors involved in the management of these patients were analyzed.

Results

From the 3 patients with iliac artery aneurysm, two were male and one female, mean age 60 years, average smoking age 15 years in 66%, one patient with diabetes mellitus, two patients with a history of previous abdominal surgery, 70 % corresponded to aneurysm of the common iliac artery, average maximum diameter of the aneurysms 50 mm. One patient was managed with open surgery and two Endovascular. For open surgery, an 8 mm linear ringed PTFE (polytetrafluoroethylene) graft was used, and for endovascular surgery, a total of 5 covered stents. One of the patients with a stent presented an artery rupture and required a blood transfusion. The three patients evolved with total closure of the aneurysm. The 2 endovascular patients were discharged after 48 hours and the open surgery patient remained 96 hours post-surgery. Only one patient required hypogastric embolization. Follow-up in the outpatient clinic was uneventful, with good distal pulses and no ischemic complications Table 1.

Case 1

The patient was a 72-year-old female, with a history of schizophrenia of 15 years of diagnosis, under treatment with trifluoperazine and clonazepam, currently controlled, COPD without treatment or follow-up. Surgical history: hysterectomy 10 years ago secondary to uterine myxomatosis. Drug addiction: chronic smoking at a rate of 20 cigarettes/day for 50 years, the rest denied. Current condition: started 2 days ago with pain in the left iliac fossa that progressively radiates to the hypogastrium and right iliac fossa, decreasing the pain spontaneously, abdominal ultrasound reports the presence of a common iliac artery left aneurysm. At physical examination the patient presented soft abdomen, painful on deep palpation in the mesogastrium and left iliac fossa, accompanied by pulsatility. No palpable masses or signs of peritoneal irritation. Lower extremities with arterial integrity pulses 2/2 of good intensity bilateral ITB 1 (Fig. 1).

3D CT angiography with reconstruction showed the presence of a left common iliac aneurysm with a neck length from the level of the aortic bifurcation of 10 mm in diameter and a diameter of the iliac artery of 13 mm at the proximal level, diameter maximum of the aneurysm is 36 mm with a length of 80 mm ending in the bifurcation of the external and internal iliac artery without dilatation of the hypogastric artery, external iliac distal neck of 10 mm. She is taken to diagnostic and therapeutic arteriography, a 5 Fr right femoral introducer is placed, a 0.35 guide is introduced, a pigtail catheter up to the bifurcation, control arteriography is performed with an injector where the diameters are confirmed. It was decided to perform endovascular treatment with a covered stent, oversize it up to 16 mm. In order to insert the stents, an 18-fr introducer is required, so a dissection of the left femoral artery is performed with proximal and distal vascular control. A 0.35 guidewire is inserted with a centimeter catheter where previous measurements are confirmed, the guide is removed and an amplatzer support is placed through which 3 covered stents are introduced, dispensed by a 16 mm x 38 mm balloon (they only have a measurement of 38 mm in length per 3 stents are required to cover the 80mm length) at the end, control arteriography is performed, vessel rupture is observed with contrast medium leaking into the retroperitoneal area of the distal iliac stent with narrowing in the stent cone at 10 mm, so it is necessary to place a last one of 10 mm x 50 mm coated, arteriographic control shows absence of leakage adequate passage of the contrast medium. Presenting discharge at the time of

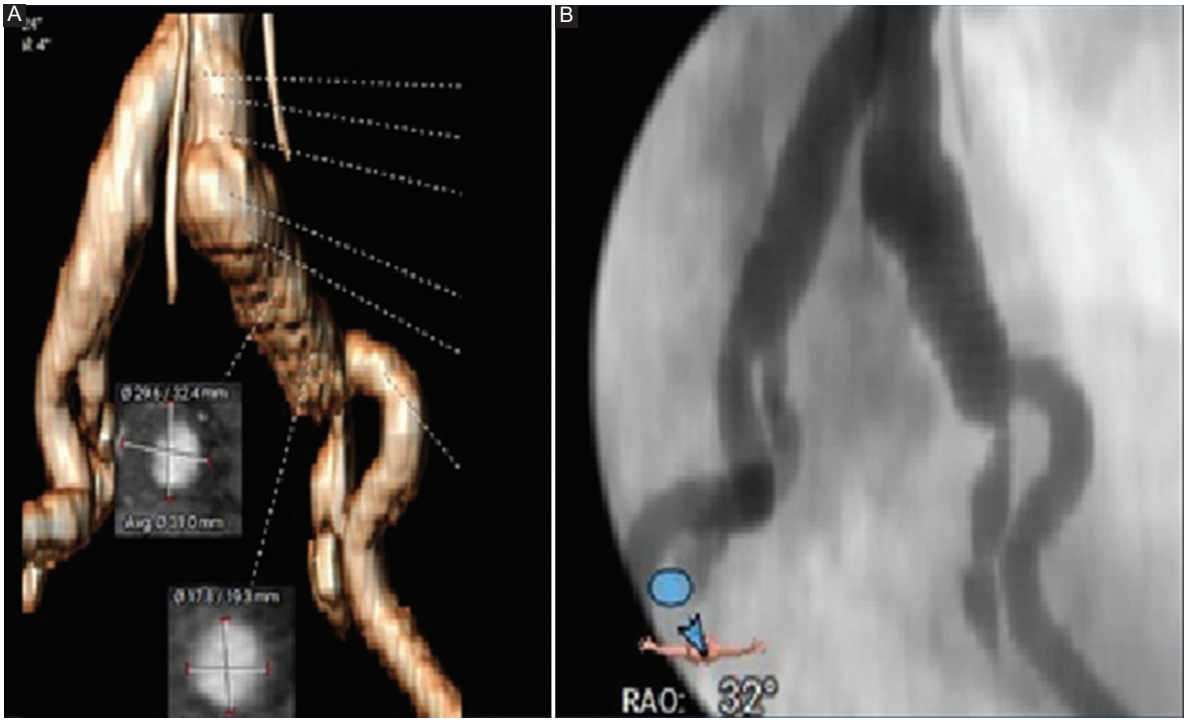

Figure 1. A: 3D CT angiography and arteriography showing left common iliac artery aneurysm. **B:** neck of 13 mm, largest diameter of the aneurysm of 36 mm and distal neck of 10.6 mm.

Figure 2. A: placement of 3 16 x 38 mm covered stents. **B:** 4 stents covered to seal a 10 x 50 mm leak. **C**: control angiography for closure of the aneurysm with adequate passage of contrast medium.

rupture and through the introducer without repercussions on vital signs, a globular package was given. The patient evolved satisfactorily with good intensity pulses without complications, so she was discharged after 48 hours without complications (Fig. 2).

Case 2

The patient was a 64-year-old male, with a history of type 2 diabetes mellitus of 4 years of evolution on treatment with metformin 500 mg, one tablet orally every 24

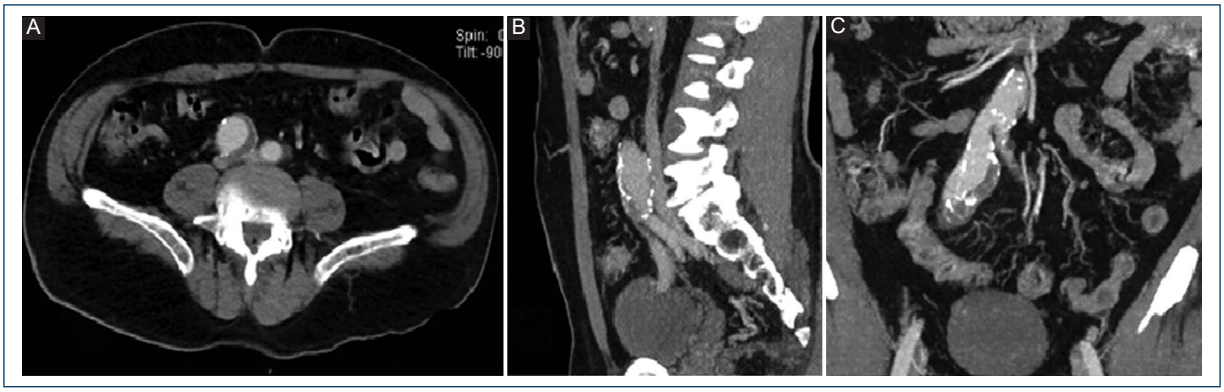

Figure 3. Right compunction iliac aneurysm (RIA) with a 13-mm neck, maximum aneurysm diameter of 32 mm, and a 12-mm distal neck without hypogastric involvement. **A:** transverse plane. **B:** sagittal plane. **C:** coronal plane.

hours. Surgical: open cholecystectomy 30 years ago. Tonsillectomy 20 years ago. Left renal extracorporeal lithotripsy 15 years ago, open nephrolithotomy 5 years ago. Drug addiction: smoking from the age of 15 to the present, 15 cigarettes per day. Current condition: started on April 20 with diffuse onset lumbar pain in the left region that did not improve with analgesics. He went to a private urologist due to a history of lithiasis who indicated control laboratories where urinary tract infection was reported. Management with antibiotics was started without improvement. The treating physician performs a simple and contrasted tomography where he reports an aneurysm of the right common iliac artery, he is sent to the emergency room of this hospital. Physical examination shows soft abdomen, not painful on superficial or deep palpation, with no evidence of peritoneal irritation, normal peristalsis, without signs of peritoneal irritation and lower extremities with arterial integrity pulses 2/2 of good intensity bilateral ITB 1 (Fig. 3).

Angiotomography with 3D reconstruction confirms the presence of a right common iliac aneurysm with neck length from the level of the aortic bifurcation of 11 mm in diameter and a diameter of the iliac artery of 13.4 mm at the proximal level, maximum diameter of the aneurysm is of 32 mm with a length of 65 mm that ends in the bifurcation of the external and internal iliac artery without dilation of the hypogastric artery, external iliac distal neck of 12 mm. He is taken to diagnostic and therapeutic arteriography, a 6 fr left femoral introducer is placed, a 0.35 guide is inserted, a pigtail catheter up to the bifurcation, control arteriography is performed where the previous measurements are confirmed. A cross over was performed towards the right iliac femoral artery, a new control arteriography in which we observed an 11-mm hypogastric artery, for which embolization was decided, a guidewire and diagnostic catheter were inserted up to the right hypogastric, once a guidewire and catheter were in the right hypogastric, the catheter was withdrawn and 10 x 25 mm, 12 x 20 mm, 15 x 25 mm coils are introduced with a latency of 5 min. With arteriography, the absence of contrast medium towards the hypogastric region is verified. We proceed to infiltrate 10 ml of anesthesia in the right inguinal region, an incision is made to approach the right common femoral artery, distal and proximal vascular control with longitudinal arteriotomy, placement of a 10-f introducer guided by fluoroscopy up to the common iliac artery, guide 035 is placed; 1 stent is inserted coated dispensed by 13 mm x 96 mm balloon which covers the total length of the aneurysmal lesion, control arteriography was performed without the presence of endoleak and toral closure of the sac. Atheriotomy was closed with 6-zero vascular prolene and closure by planes. The patient evolved satisfactorily with good intensity pulses without complications, so he was discharged after 48 hours without complications (Fig. 4).

Case 3

The patient was a 45-year-old male with a chronic disease, surgical, and drug addiction history denied. He refers to abdominal trauma 20 years ago while playing soccer. Current condition: started 5 months ago with increased volume and pulsatile tumor in the left inguinal region and in the hypogastrium without pain, 6/10 reported sudden pain 4 days prior to admission, USG of soft tissues showed a probable iliac artery aneurysm, for which he was referred to this unit. He is assessed by the angiology service and his admission is decided. On physical examination, the abdomen was soft, at the

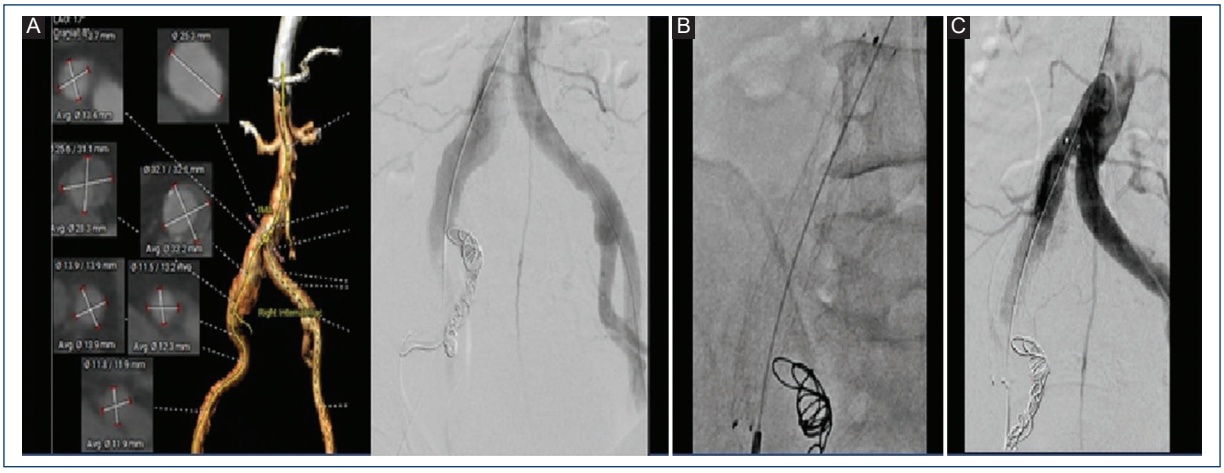

Figure 4. A: 3D tomography angiography and arteriography. **B:** hypogastric embolization with 10 x 25 mm, 12 x 20 mm and 12 x 20 mm coils. **C:** stent covered with 13 x 96 mm control arteriography for sac closure with adequate passage of contrast medium.

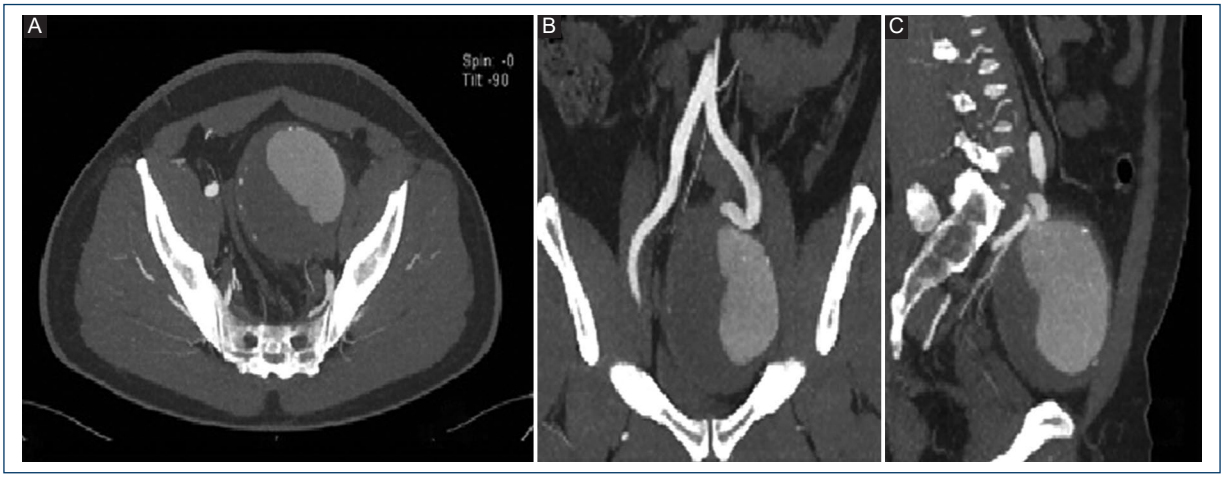

Figure 5. Tomography angiography showing a giant left iliac aneurysm (LAI), occupying the entire pelvic floor without involvement of the hypogastric artery. **A:** transverse plane. **B:** coronal plane. **C:** sagittal plane.

hypogastrium level a pulsatile tumor was palpated, without being able to clearly define the extension, adhered to deep planes, not painful on palpation, normal peristalsis, without signs of peritoneal irritation. Lower extremities with arterial integrity pulses 2/2 of good intensity bilateral ITB 1 (Fig. 5).

Angiotomography with 3D reconstruction confirms the presence of a left common iliac aneurysm with a neck length from the level of the aortic bifurcation of 40 mm in diameter and a diameter of the iliac artery of 13 mm at the proximal level, maximum diameter of the aneurysm is 90 mm with a length of 120 mm that ends at the bifurcation of the external and internal iliac artery without dilation of the hypogastric artery, external iliac distal neck of 11 mm. He is taken to open surgery since the iliac angles are 95 degrees, he does not meet the criteria for endovascular therapy due to anatomy. Prior asepsis and tracheal intubation, infra-umbilical midline incision, a giant 9-mm aneurysm is identified that occupies the entire pelvic cavity. Proximal vascular control of the left common iliac is performed, as well as distal control, identification of the hypogastric, which is ligated. An aneurysmectomy of the entire aneurysmal sac is performed, avoiding injury to the ureter and colon. Placement of an 8-mm ringed polytetrafluroethylene graft 4 cm from the aortic bifurcation to the

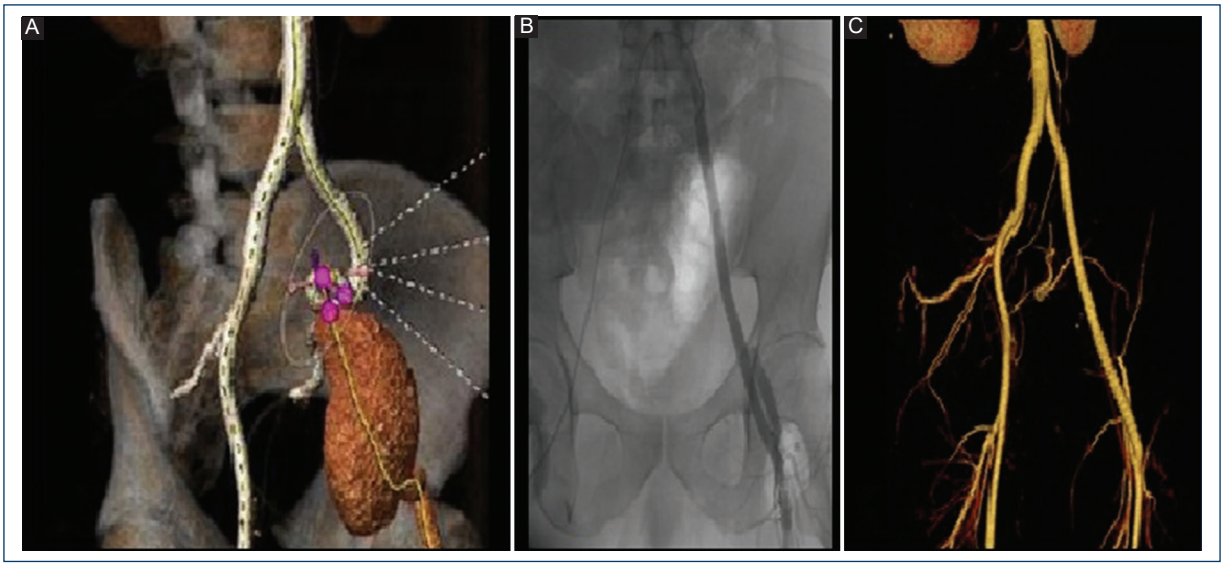

Figure 6. A: 3D computed tomography angiography of AII with a 13-mm proximal neck, a 90-mm maximum aneurysm diameter, and a 12-mm distal neck. **B:** intraoperative arteriography showing end-lateral iliac femoral bypass with PTEE graft, adequate passage of contrast medium. **C:** 3D CT angiography at 3 months.

external iliac artery with continuous 6-zero vascular prolene sutures. Control arteriography shows occlusion of the distal graft due to a decrease in the diameter of the left external iliac artery, which is why the graft is extended to the left femoral region with end-lateral anastomosis. Graft patency control arteriography. Abdominal wall bleeding of 500 cc is closed without hemodynamic repercussions, distal pulses present. The patient evolved satisfactorily with good intensity pulses without complications, so he was discharged after 48 hours without complications (Fig. 6).

Discussion

The goal of surgical treatment of iliac aneurysm is to prevent rupture. Before the advent of endovascular repair, open surgery was the mainstay of treatment. But with a significant decrease in morbidity and mortality, and fewer complications in patients with iliac artery, endovascular aneurysm repair can be considered as first line therapy[2]. Iliac aneurysms have certain peculiarities that make open access difficult (location deep within the pelvis, intimate relationships with veins, proximity to the ureter, and difficulty exposing distal branches)[3].

AAIC common iliac artery aneurysms are more frequent in females. We present two cases of males, as a history of higher frequency, smoking was present for an average of 15 years, abdominal trauma and abdominal surgery. The giant aneurysm that underwent open surgery, the pathological study did not find any vascular abnormality of the arterial wall. In one case, the patient underwent open surgery because the tortuosity of the iliac veins did not allow endovascular access and the risk of endoleak was greater. In the other 2 cases, the anatomy favored the endovascular approach by presenting less tortuosity and proximal and distal necks.

The mortality rate in cases treated electively with open procedures is 10%. Mortality rises to 33-50% when the aneurysm ruptures. Rupture occurs in 38-51% of cases and characteristically presents with progressive sharp pain, hypotension, and a pulsatile mass in the lower abdomen and inguinal area.

Endovascular repair is the mainstay in the treatment of isolated AAIC, it is safe and feasible. Low mortality rates with excellent technical success rates for primary patency have been observed[4]. The 3 patients were admitted due to constant abdominal pain in the hypochondria region with irradiation to the lumbar region without loss of pulses with a pulsatile mass assessed by other services with suspicion of urinary and digestive pathologies, for which they underwent tomography with which diagnosis and sent to the service. Tomography angiography was the study of choice to confirm the diagnosis. All patients were sectioned and the anatomy of the iliac region was analyzed to determine the best therapeutic option. The reconstruction of the 3D tomography allowed to know more about the characteristics of the aneurysms.

Table 2. Anatomical features of common iliac artery aneurysms

Patient	Aneurysm	Proximal neck (mm)	Longitud del aneurisma (mm)	Distal neckl (mm)	Maximum diameter of the aneurysm (mm)
1	Left	13	80	11	36
2	Right	13	65	12	32
3	Left	13	120	11	90

Table 3. Technique and type of material used for iliac artery aneurysm repair

Paciente	Technique	Type of material	Amount	Measures	Discharge (hours)
1	Endovascular	Covered Stent	4	Three: 16 x 38 mm One: 10 x 50 mm	48
2	Endovascular	Overed Stent	1	13 x 96 mm	48
3	Open	Graft PTFE	1	8 mm, linear ringing of 40 cm	96

The Endovascular technique is associated with reduced surgical trauma, shorter hospital stay and less blood loss, with faster postoperative recovery. Endovascular repair of these aneurysms has recently become the preferred form of treatment, when adequate anatomy exists for endovascular repair. Endovascular treatment of AAIC aneurysms has become the first-line treatment whenever anatomical conditions allow it. It should be noted that proximal and distal necks (> 1.5 cm in length) without mural thrombus are necessary to have a correct landing zone.

In addition, the diameter of the proximal seal zone is usually significantly larger than the diameter of the distal seal zone, which in most cases is the external iliac (hypogastric) artery. When treating AAIC by any method, strategies to preserve pelvic circulation should be considered. The natural history of internal iliac (hypogastric) artery aneurysms is still unclear, but several authors recommend repairing these aneurysms when the diameter exceeds 3 cm, since the risk of rupture in such cases is 14-31%. The loss of one or both internal iliac arteries exposes the patient to a greater risk of pelvic ischemia such as colon ischemia, buttock claudication, and erectile dysfunction[5].

In all three cases we knew the importance of preserving the hypogastric artery; in all cases we opted for its occlusion since we had the other healthy hypogastric branch, the age of the patients, and the degree of collateral circulation. The follow-up of the outpatient clinic did not present data of gluteal or colon spinal cord ischemia. Only in one case was the diameter of the hypogastric artery considered to be at risk of endoleak, so it was excluded with coil placement. Some authors who do not have access sites to treat endoleaks in endovascular repair sites for AAIC have opted for other alternatives such as a direct percutaneous transgluteal approach. Lumbar branches are located, which is embolized with coils, thus obtaining closure of the aneurysmal sac[6].

Currently, there are more modern treatment options to avoid occlusion of the hypogastric arteries in AAIC and it is the branched stents which are only indicated when the patient has a landing site that can help preserve pelvic flow. The patients did not have diameters that would allow the deployment of a branched endoprosthesis at the iliac level. The evolution of the patients is usually to complications such as rupture. There is a rare case reported in the literature of a large and isolated AAII that experiences spontaneous thrombosis without surgical intervention (diameter 5.5 cm from the internal iliac artery), a rare presentation that has not been previously reported in the literature[7]. The early diagnosis of the 3 patients and the selection of the best therapeutic option allowed a good technical result.

Conclusions

Common Iliac Artery Aneurysms occur in a very low percentage, palpation of a pulsatile mass and pain in the hypochondrium can guide the diagnosis but in a patient with an abdomen with a large adipose

panniculus it is difficult. Late detection is associated with rupture of the aneurysm with a very high mortality. Treatment is very complex, surgical or endovascular resolution requires adequate parification to obtain good results.

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References

1. Joviliano E, Vieira D, Moreira L et al, Endovascular treatment of bilateral isolated aneurysm of the Internal iliac artery. Jornal Vascular Brasileiro 2019:18; 1677.
2. Centofanti G, Nishinari K, De Fina B et al. Isolated iliac artery aneurysm in association with congenital pelvic kidney treated with iliac bfranch device: case report. Journal of cardiothoracic surgery 2021;16:26
3. Gaudic J, Tresson P, Derycke L et al. Surgical internal iliac artery preservation associated with endovascular repair of infrarenal aortoiliac aneurysms to avoid buttock claudication and distal type I endoleaks. J Vasc Surg 2018: 68(8);1736-1743.
4. Charisis N, Bouris V, Rakic A et al. A systematic review on endovascular repair of isolated common iliac artery aneurysms and suggestions regarding diameter thresholds for intervention. J Vasc Surg 2021:1;11.
5. Imtinene BM, MeleK BM, Sobbi M et al. Endovascular management of an isolated common iliac artery aneurysm: a case report. PAMJ 2021 40(69)
6. Worgul C, Wu G, Kansal N et al. Percutaneous Access of an expamding internal iliac artery aneurysm via a direct posterior transgluteal approach. Annals of vascular surgery 2019: 58: 311.
7. Lin M, Drucker C, Morales D, et al. Spontaneous thrombosis of an isolated internal iliac artery aneurysm. Ann Vasc Surg 2021:73; 545.

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CLINICAL CASES

Abdominal reconstruction in a patient with flank hernia after trauma, a case report and review of the literature

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Abstract

Lateral abdominal herniae are rare, they usually occur after trauma, vascular or renal surgery, their incidence is less than 2%. Since 1906 there are just about 250 reported cases and there are many treatment options, including laparoscopic approach, direct muscle approximation with sutures, mesh, suture anchors and, even, conservative treatment. We present the case of a 30 year old male who suffers a motorcycle crash that results in a posttraumatic flank hernia. He was treated with a delayed abdominal wall reconstruction using polypropylene mesh and a fascia lata graft. There is no algorithm or specific treatment for lateral abdominal herniae and, because of its low incidence, little is known about their evolution and long-term results of the distinct reconstruction techniques. It´s possible to reconstruct the abdomen wall early or delay it, depending on the abdominal cavity contamination and the patient´s general condition.

Keywords: *Lateral. Hernia. Posttraumatic. Lumbar.*

Introduction

The incidence of lateral hernias is low, which makes them an infrequent pathology in clinical practice. Due to this, their reconstruction is an issue that is often discussed, without having standardized management[1]. There are only around 250 cases reported in the literature to date[1]. The first reported case was described in 1906 by Clarence Selby[2], in which he presents a patient with a hernia after a 2-meter fall as a 32-year-old construction employee. The current 2009 European Hernia Society (EHS) classification includes lateral abdominal hernias into 4 bilateral zones: subcostal (L1), flank (L2), iliac (L3), and lumbar (L4)[3]. Even having this classification with well-defined nomenclature, some case reports indiscriminately use the term "flank hernia", referring to hernias that are located lateral to the rectus muscle, which can create confusion in the data, however, the management and approach of flank, iliac, and lumbar hernias can generally be performed in the same way as the specific location has little impact on outcome[4,5].

With respect to lateral hernias, about 80% are acquired and the remaining 20% correspond to congenital hernias, the latter frequently associated with other malformations[6]. Of the acquired hernias, these are frequently associated with renal, hepatic, and vascular surgery and, less frequently, trauma[7]. Identified risk factors for flank hernias are: high body mass index (BMI >30), end-stage renal disease, chronic obstructive pulmonary disease, smoking, diabetes mellitus, hypertension[7], longer

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flank surgical incision at 15cm probably associated with nerve injury and prolonged immunosuppression in renal transplant patients[1]. The aim of the present manuscript is to report a case managed at the General Hospital of Mexico "Dr. Eduardo Liceaga" by the general surgery service in conjunction with plastic and reconstructive surgery.

Case report

This is a 30-year-old male, a bodybuilder by occupation prior to the current condition, with a BMI of 25 kg/m^2, with no significant clinical or surgical history. The patient presents abdominal trauma caused by a motorcycle accident, he is admitted to an external hospital with a diagnosis of hypovolemic shock, fracture of the left iliac bone and lumbar displacement in L2-L3, at that time an exploratory laparotomy was performed in which an external iliac artery lesion was found and repaired and damage control surgery and abdominal packing with compresses to later be referred to another institution where he continued his management with surgical toilets and abdominal closure contained to the skin with an incision on the left iliac surface. Eight months after the closure, the patient is referred to our hospital, where the joint protocol of the general surgery service is carried out in the wall and soft tissue clinic and in the plastic and reconstructive surgery service.

On physical examination, patient was found with abdominal asymmetry due to increased volume of the flank and left iliac surface, approximately 30x15x4cm, with hyperchromic coloration, skin with telangiectasias, skin and fat atrophy, localized hyperthermia, Intestinal peristalsis is palpable on the abdominal flank, it is not possible to delimit all the edges of the defect with palpation. A bone fragment corresponding to the anterosuperior iliac crest rotated lateral, anterior and caudal is palpated and above it, the hernia. There were no alterations in gait or sensory alterations in the area (Fig. 1). Computerized axial tomography shows (Fig. 2) the hernial sac containing the sigmoid colon and small bowel loops, the fracture of the anterior superior iliac crest, consolidated in an abnormal position, disinserted of the major and minor oblique muscles and retraction towards cephalic and posterior.

Surgery is performed in April 2021, starting the general surgery service, with an open preperitoneal approach on a previous scar on the left iliac surface, the skin is incised with a scalpel, the hernial sac is located towards the head, it is dissected at its edges caudal, medial and cephalic, towards the posterior surface, there is difficulty in continuing the dissection as it is close to the thoracolumbar fascia and it is necessary to open the sac to continue, the sigmoid colon is found and it is rejected with the help of compresses and a Deaver colon separator. Once the sac was completely

Figure 1. The asymmetry caused by the hernia in the right flank is observed.

Figure 2. Coronal cut computed tomography showing the disinsertion of the left oblique muscles, the fracture of the iliac bone and the lateral hernia containing the sigmoid colon.

Figure 3. Abdominal wall defect with reduced hernial sac and polypropylene mesh placed.

dissected, repaired and reduced, the defect was identified, approximately 25x15cm;an attempt was made to approximate the oblique muscles towards the ipsilateral anterior superior iliac crest without success since the retraction and contracture did not allow it, in addition to the anomalous position due to its consolidation, it was decided to place a light macroporous polypropylene mesh 30x30cm, which is made to adjust to the defect and be fixed to the fascia of the oblique major towards the cephalad, the anterior sheath of the left rectus towards the medial, the anterior superior iliac crest towards the caudal and the thoracolumbar fascia towards the lateral (Fig. 3). Due to the significant cutaneous and fatty atrophy of the skin overlying the hernia, it was decided to take a strip of lata fascia from the left leg, approximately 25x7cm, which allows the mesh to be covered to reduce the risk of its exposure to the skin, as well as to give continuity from the fascia of the greater oblique to the anterior superior iliac crest and fix it to the same anatomical sites mentioned above with 0 polypropylene suture (Fig. 4). A closed drain is placed and the skin that surrounds is remodeled. Subcutaneous fatty tissue decreased and closure was performed in three planes.

Figure 4. Fascia lata covering the polypropylene mesh.

In the immediate postoperative period, the reduction (Fig. 5) and containment of the hernia was evident, the patient continued walking without difficulty or pain and was discharged having adequate pain control with oral medications. He continues with follow-up by external consultation 48 hours after the intervention. The drain is removed one week after discharge, once it has output of less than 30 ml/day and serous characteristics, the patient is kept without physical exertion for 6 months to avoid recurrence.

Discussion

Post-traumatic hernias are rare pathological entities, usually caused by car crashes (60%), motorcycle accidents (20%), falls (13%), pedestrian collision with a motor vehicle and injuries associated with bullfighting (7%)[8,9,10]. Despite the low incidence in blunt trauma (0.17%-1.5%), suspicion of hernia must be present when performing general and directed abdominal exploration. Clinical examination, in this type of hernia, has a sensitivity between 29-42%[11] and the most frequent findings are ecchymosis (49%), localized volume increase or bulge (39%)[12]. Frequently, the patient with post-traumatic hernia presents associated intra-abdominal or vascular lesions (25-70%) that require an urgent laparotomy, coupled with the low sensitivity of the clinical examination, it is imperative to have a computed tomography in case of clinical doubt[11]. Early treatment is defined when it is

Figure 5. Photograph 48 hours after surgery.

carried out in the context of the first hospitalization during the trauma intervention and up to two weeks later, and late treatment when it is carried out in another hospitalization, after a period of two weeks, with most cases being after 6 months after the trauma. triggering event[13].

Management, as in the rest of hernias, consists of dissecting the sac to free it from the edges of the defect, reducing the sac with its contents, and repairing the defect. It is important to mention that, up to now, there is no consensus to determine the best management In most of the reported cases open approaches (preperitoneal) have been performed, through the midline in the case of blunt trauma or by extending the wound in the case of open trauma or post-incisional hernias[14-19] and laparoscopic approach in fewer cases[20,21]. The only indication found in the review for performing a laparoscopic approach is in the case of patients who did not receive immediate surgical treatment and developed symptomatic lateral hernias. Up to now, there is no evidence to suggest that laparoscopic management is better than open in the context of late repair [21].

With respect to the materials used for the repair, most of the reconstructions are with polypropylene mesh to cover the defect and few with large biological meshes. Other authors close the defect with sutures or mesh strips[9]. In one case, approximation of the lateral wall muscles was successfully performed with suture anchors[22]. In case reports or small series in which no mesh was used (the largest study is 280 patients), the recommendation is to use a mesh, preferably polypropylene, to perform abdominal reconstruction[23].

Conclusion

The case presented is unique in its kind because the consolidation in an anomalous position of the most cephalic portion of the iliac bone prevented the reinsertion of the muscles with the techniques described, since it was displaced anteriorly, laterally and caudally. The polypropylene mesh placed in the preperitoneal plane did not have adequate coverage, since the skin that was overlying the defect. The mesh had been expanded by the hernia and thinned and had little subcutaneous fatty tissue. Being a young patient who previously worked in bodybuilding and with little fatty tissue, the risk of the mesh eroding the skin and exposing was latent, so the solution was to take the fascia lata graft to cover the skin mesh and at the same time give continuity to the abdominal wall, the result was successful.

Due to the low incidence of these hernias, systematizing management is complicated; however, the best time to perform the procedure must be recognized, taking into account that by performing it early, the probability of reinserting the muscles, with the chosen technique, is more likely to be successful. The use of mesh in early reconstructions is limited by contamination of the abdominal cavity in cases of intestinal lesions, leaving the management of these patients for late reconstructions, which is valid and with good results.

The management of this pathology must be individualized and the best option chosen taking into account the injuries caused by the trauma, without fearing to leave the abdominal reconstruction in a second stage in case of presenting other injuries that endanger the patient's life or compromise the result. A case report is statistically limited, however, the technique is considered innovative since up to now there are no case reports in which an autograft is used to cover the mesh in the reports found in the literature.

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References

1. Zhou DJ, Carlson MA Incidence, etiology, management, and outcomes of flank hernia: review of published data. Hernia 2018;22(2):353–361
2. Selby CD. Direct abdominal hernia of traumatic origin. *JAMA*. 1906;47:1485–1486
3. Muysoms FE, Miserez M, Berrevoet F et al Classification of primary and incisional abdominal wall hernias. Hernia 2009;13(4):407–414
4. Cavalli, M., Aiolfi, A., Morlacchi, A. *et al.* An extraperitoneal approach for complex flank, iliac, and lumbar hernia. *Hernia* 2021;25, 535–544
5. Beffa LR, Margiotta AL, Carbonell AM. Flank and Lumbar Hernia Repair. Surg Clin North Am. 2018 Jun;98(3):593-605
6. Rattan KN, Agarwal A, Dhiman A, Rattan A. Congenital lumbar hernia: a 15-Year experience at a single tertiary centre. Int J Pediatr 2016:1–4
7. Patel PP, Warren JA, Mansour R, Cobb WS, Carbonell AM. A large single-center experience of open lateral abdominal wall hernia repairs. Am Surg 2016;82(7):608–612
8. Bodda AK, Sasmal PK, Mishra S, Shettar A. Mesh hernioplasty in emergency repair of traumatic abdominal wall hernia following bull horn injury. BMJ Case Rep. 2021 Jul 21;14(7)
9. Kearney AM, Dumanian GA. Simplified Repair of Traumatic Iliac Crest Flank Hernias with Mesh Strips. Plast Reconstr Surg Glob Open. 2020 Jul
10. Azimi-Ghomi O, Ehrhardt JD Jr, Hai S. Traumatic abdominal wall hernia caused by a low fall. Trauma Case Rep. 2021;Dec 9;37:100572
11. Steenburg SD, Padilla-Jones B, Lee JT, Petersen MJ, Boutselis AG, Lay SE, Dunkle JW, Chong S. Traumatic abdominal wall injuries-a primer for radiologists. Emerg Radiol. 2021 Apr;28(2):361-371
12. Hernandez Cervantes BY, Martínez Lopez D, Guzman Lambert R, Rodríguez Gonzalez M, Meah M. Acute traumatic abdominal wall hernia-value of the physical examination: case report. J Surg Case Rep. 2021 Jul 23;2021(7)
13. Karhof S, Boot R, Simmermacher RKJ, van Wessem KJP, Leenen LPH, Hietbrink F. Timing of repair and mesh use in traumatic abdominal wall defects: a systematic review and meta-analysis of current literature. World J Emerg Surg. 2019 Dec;17;14:59
14. Baig N, Elberm H, Warren P. Traumatic inferior lumbar hernia. J Surg Case Rep. 2022 May 27;2022(5)
15. Harrell KN, Grimes AD, Albrecht RM, Reynolds JK, Ueland WR, Sciarretta JD, et al. Management of blunt traumatic abdominal wall hernias: A Western Trauma Association multicenter study. J Trauma Acute Care Surg. 2021 Nov 1;91(5):834-840
16. Roham A, Gardner P, Heller J, Gerken J, Lumley C. Reconstruction of traumatic lumbar hernias: A case report. Int J Surg Case Rep. 2018;49:153-157
17. Chow KL, Omi EC, Santaniello J, Lee JK, McElmeel DP, Thomas YM, et al. Traumatic abdominal wall hernias: a single-center case series of surgical management. Trauma Surg Acute Care Open. 2020 Dec 1;5(1):e000495
18. Skelhorne-Gross G, Nantais J, Ditkofsky N, Gomez D. Massive traumatic abdominal wall hernia with significant tissue loss: challenges in management. BMJ Case Rep. 2021 May 5;14(5):e242609
19. Alhadeedi O, Gruner L, Lasseur A, Monneuse O. Traumatic Abdominal Wall Hernia-A Series of 12 Patients and a Review of the Literature. World J Surg. 2021 Sep;45(9):2742-2746
20. Novitsky YW. Laparoscopic repair of traumatic flank hernias. Hernia. 2018 Apr;22(2):363-369
21. Ferris M, Pirko C, Nottingham J. Delayed laparoscopic repair of a traumatic flank hernia: A case report and review of the literature. Int J Surg Case Rep. 2018;51:372-375
22. Roham A, Gardner P, Heller J, Gerken J, Lumley C. Reconstruction of traumatic lumbar hernias: A case report. Int J Surg Case Rep. 2018;49:153-157
23. Harrell KN, Grimes AD, Albrecht RM, Reynolds JK, Ueland WR, Sciarretta JD, et al. Management of blunt traumatic abdominal wall hernias: A Western Trauma Association multicenter study. J Trauma Acute Care Surg. 2021 Nov 1;91(5):834-840

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CLINICAL CASES

Biliary ileus an uncommon cause of intestinal occlusion: case report

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Abstract

Biliary ileus is an uncommon cause of intestinal occlusion caused by the impaction of a biliary stone in the gastrointestinal tract. We present the case of a 69-year-old female with no comorbidities, with abdominal pain, constipation and vomiting of 6 days of evolution. Physical examination showed abdominal distension and diffuse abdominal pain on palpation. No laboratory alterations, except for elevated creatinine. A CT scan showed a hyperdense image in the intestine. An exploratory laparotomy and enterolithotomy were performed confirming suspected diagnosis of biliary ileus.

Keywords: *Female, Gallstones/complications. Intestinal obstruction. Biliary fistula.*

Introduction

Gallstone ileus is a mechanical obstruction of the intestine caused by the impaction of a gallstone in the gastrointestinal tract. This is due to a cholecystoenteric fistula more frequently in the ileum (60%) and secondly in the colon[1,2]. It is a rare complication of cholelithiasis, accounting for 1-4% of the causes of intestinal obstruction and occurring in 0.3-0.5% of cases of cholelithiasis[3]. The case, diagnostic and therapeutic approach in a patient with gallstone ileus from northeastern Mexico.

Case Report

The patient is a 69-year-old female with no history of chronic degenerative diseases with a history of umbilical plasty without mesh 15 years ago, smoking 20 packs/year, and no previous hospitalizations. She came to the consultation with a 6-day history of moderate cramping abdominal pain, progressive in the epigastrium that later became generalized, accompanied by nausea, vomiting, and constipation. She came to our unit for presenting 6 episodes of vomiting 24 hours prior to her admission with fecaloid characteristics. On physical examination, she was hemodynamically stable, neurologically intact, with signs of dehydratation. The abdomen was distended with abscence of peristalsis, a soft abdomen with diffuse pain on deep palpation, without signs of peritoneal and tympanic irritation on percussion. The rectal examination was normal.

In the laboratories without alterations except a creatinine of 3.67. The x-ray (Fig. 1) and simple abdominal tomography evidence a hyperdense image in the intestine (Fig. 2).

In the exploratory laparotomy, dilated intestinal loops were found 200 cm from the ileocecal valve. A longitudinal

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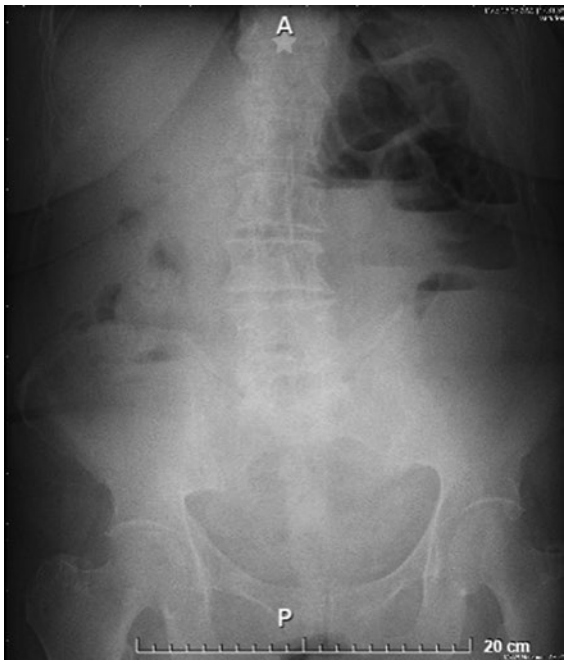

Figure 1. Abdominal X-ray. Air-fluid levels and absence of distal gas are observed.

Figure 2. Simple abdominal CT shows a calcified mass in the intestine, without the presence of pneumobilia. **A:** axial. **B:** coronal section.

enterotomy was performed and a stone was removed that occludes 100% of the intestinal lumen, a site of occlusion without vascular compromise (Fig. 3). Subsequently, repair is performed in 2 planes, the first with 3-0 Connel Mayo vicryl and the second with 3-0 Lembert silk. The rest of the intestine and colon are explored without finding more stones. With adequate postoperative evolution, he was discharged home on the fifth postoperative day.

Discusion

Gallstone ileus is often preceded by an episode of cholecystitis. Inflammation in the gallbladder conditions the formation of adhesions. The gallbladder wall erodes under the effect of stone pressure and inflammation, causing the formation of a fistula between the gallbladder and the adjacent gastrointestinal tract, with subsequent passage of a gallstone. Less frequently, the stone may enter the duodenum through a dilated toilet papilla. Other causes of gallstone ileus are: complication of an ERCP or endoscopic sphincterotomy and the consequence of loose stones in the abdominal cavity after a laparoscopic cholecystectomy, although these are very rare cases[4,5].

The duodenum is the most frequent site of origin of the fistula in 75 to 83% of cases due to its proximity to the gallbladder. However, the stomach, small intestine, and colon may be involved. The gallstone can spontaneously pass through the rectum, or become impacted and cause intestinal occlusion. Stones <2.5 cm mostly pass spontaneously without causing obstruction. Multiple stones have been reported in 3–40% of gallstone ileus cases. The most frequent site of impaction is the ileum (50 to 60%), jejunum (16 to 27%), duodenum (3.5 to 14.6%), and colon (3 to 4%), in that order. If the patient with gallstone ileus is not treated early, it can cause ischemia due to the pressure generated from distension, stone and inflammation. With subsequent perforation and peritonitis, with a mortality of 12 to 27% when it is not diagnosed in a timely manner[4,5].

Up to 50% of patients with gallstone ileus have no history of gallbladder disease. Other related causes are

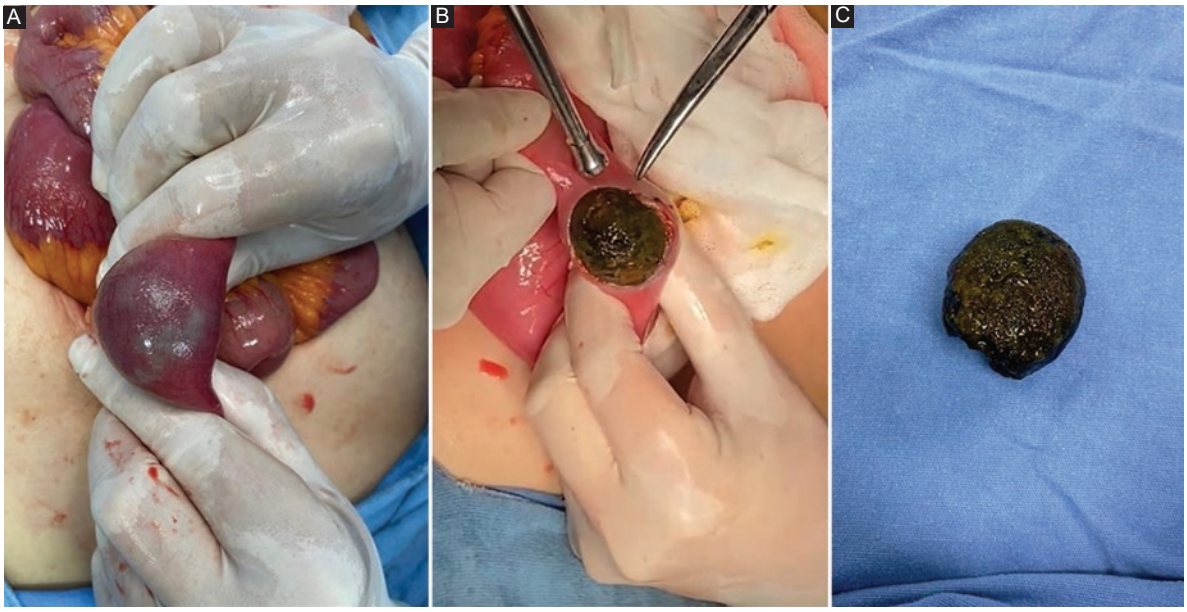

Figure 3. Intraoperative findings. **A:** bowel loop with stone inside. **B:** longitudinal enterotomy. **C:** 3.8 x 3.5cm stone.

previous gastric surgery, cholecystectomy, abdominal trauma.[3,6] Our patient had no significant prior history.

Due to the insidious and non-specific presentation of signs and symptoms in patients with gallstone ileus, the diagnosis is delayed. Imaging studies have a crucial role in diagnosis. Radiography has a low sensitivity and specificity, Riegler's triad (aerobilia, dilated loops and ectopic stone) is observed in only 15% of cases. In the CT scan, 96% show signs of intestinal obstruction, 88% pneumobilia, 14% air in the gallbladder, ectopic stones are observed in 81%, fistula is only detected in 11% and Riegler's triad in a 77% of the cases. CT can define the site of obstruction and help in making therapeutic decisions, being the imaging study of choice[2,5].

There are 3 options for surgical management of these patients (one-stage surgery, two-stage surgery, and only enterolithotomy). One-stage surgery consists of performing enterolithotomy, cholecystectomy, and closing the fistula. In two-stage surgery, cholecystectomy and fistula closure is performed 4-6 weeks after enterolithotomy. Currently, the management of choice is enterolithotomy, due to the high morbidity and mortality of one and two-stage surgery. The recurrence of gallstone ileus after enterolithotomy is 5-9% and complications are rare, due to the spontaneous closure of the fistula in most cases. The stone can be removed by colonoscopy, laparoscopic and open surgery[1,6]. Endoscopy is reserved for patients with high surgical risk where the stone can be reached by this means[5].

Conclusion

Gallstone ileus is a rare cause of intestinal obstruction. The clinical picture is intestinal obstruction without characteristic data, the diagnosis is with a detailed analysis of the imaging studies. The diagnosis is confirmed in the intraoperative period. The imaging study of choice is CT and the treatment is enterotomy. Fistula repair and cholecystectomy are only performed in patients with justified indications.

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References

1. Jakubauskas M, Luksaite R, Sileikis A, Strupas K, Poskus T. Gallstone ileus: Management and clinical outcomes. Med. 2019;55(9).
2. Lassandro F, Gagliardi N, Scuderi M, Pinto A, Gatta G, Mazzeo R. Gallstone ileus analysis of radiological findings in 27 patients. Eur J Radiol. 2004;50(1):23–9.
3. Mauricio GU, David Eugenio HG, Enrique QF. Gallstone ileus of the sigmoid colon caused by cholecystocolonic fistula: A case report. Ann Med Surg [Internet]. 2018;31(May):25–8. Available from: https://doi.org/10.1016/j.amsu.2018.06.001
4. Inukai K. Gallstone ileus: a review. BMJ Open Gastroenterol. 2019 Nov 24;6(1):e000344. doi: 10.1136/bmjgast-2019-000344.
5. Nuño-Guzmán CM. Gallstone ileus, clinical presentation, diagnostic and treatment approach. World J Gastrointest Surg. 2016;8(1):65.
6. Kreve F, Takada J, Gatto J, Loss FS, Artifon ELA. Biliary ileus: case report. Rev Gastroenterol Peru. 2017;37(2):173–6.