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Accuracy of the ultrasound examination in patients with inguinal hernia.

Avaliação da acurácia do exame ultrassonográfico em pacientes portadores de hérnia inguinal.

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A B S T R A C T

Objective: to evaluate the accuracy of ultrasonography in the diagnosis of inguinal hernia in the preoperative period of patients submitted to inguinal herniorrhaphy. **Methods:** we conducted a retrospective, descriptive, analytical study, based on data obtained from the charts of patients submitted to inguinal herniorrhaphy between January 2016 and December 2017 and who underwent ultrasonography in the preoperative period. The sample consisted of 232 patients, and we compared the results of the ultrasonography with the complaints, physical examination and intraoperative findings. **Results:** ultrasonography was in agreement with inguinal hernia complaint in 52% of patients (p=0.019). There was a disagreement between the percentage of patients who presented a hernia at the physical examination not confirmed by the ultrasound examination (28.57%) and the percentage of hernias identified only by the complementary examination (8.93%), with statistical significance (p=0.0291). When comparing the ultrasound findings with the intraoperative ones, 32.70% of patients presenting with hernia had normal ultrasonography, with statistical significance for discordance (p=0.001). **Conclusion:** ultrasound was an unreliable method to help diagnosis in dubious cases of inguinal hernia, and dispensable when the diagnosis was confirmed by typical complaints and compatible physical examination.

Keywords: Hernia. Inguinal. Diagnostic Imaging. Ultrasonography. Herniorrhaphy.

INTRODUCTION

Inguinal hernia is a frequent disease, with an important impact on daily activities. According to data obtained from the Brazilian Unified Health System (SUS), about 150,000 herniorraphies were performed in Brazil in 2017, the majority being elective and in private hospitals[1]. There was a predominance in the age range between 50 and 69 years, the highest mortality rates being found in the population older than 65 years[1,2].

New diagnostic tools have emerged in the last 40 years, making it possible to diagnose early hernias, which are still small, asymptomatic and not always noticeable on physical examination[2-4]. However, history and physical examination have sensitivity of 75 to 92% and specificity of 93% in the diagnosis of such hernias[5]. Typical hernia complaints include the reporting of bulging in the inguinal region, often related to physical exertion, with or without pain and discomfort[5,6].

Some differential diagnoses should be discarded, such as incisional hernia, femoral hernia, lipoma of the spermatic cord, varicocele, hydrocele, inguinal lymph node enlargement, endometriosis, epididymitis, testicular torsion, sebaceous cysts, abscesses, among others[2,5]. It is also important to investigate possible asymptomatic contralateral hernias that can be operated at the same surgical time[7-9]. In these cases of hidden hernias or differential diagnosis, imaging tests can and should be used for diagnostic clarification and adoption of the best approach[5,6].

Ultrasonography (USG) is a method with good acuity, noninvasive, without radiation,

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but operator-dependent, with sensitivity varying from 33% to 100%, and specificity, from 81% to 100%[7]. Computerized Tomography (CT) has been useful in occult or atypical hernias, with sensitivity of 83% and specificity of 67% to 83%[5]. Magnetic resonance imaging (MRI) is the most sensitive and specific imaging test, around 94% and 96%, respectively, but not always available in public services in our country[8].

According to the latest Brazilian consensus in approaching inguinal hernias, imaging methods should be requested only in cases of diagnostic doubt and the initial examination should be ultrasound. This guideline was disclosed in a manual at the Brazilian Congress of Hernia of 2018 as Guidelines of the Brazilian Society of Hernia for the management of inguinocrural hernias in adults. In the persistence of doubt, MRI was superior to CT[4].

The objective of this study was to evaluate the concordance and disagreement between ultrasonographic findings with complaints, physical examination and intraoperative findings of patients submitted to inguinal herniorrhaphy.

METHODS

We conducted a retrospective, descriptive, analytical study, based on data obtained from medical records of patients undergoing inguinal hernia repair between January 2016 and December 2017. The same team, from the Abdominal Wall Group of the Santo Amaro University, performed all surgeries. The data evaluated were typical complaints, physical examination, USG report and intraoperative findings. We excluded Patients younger than 13 years and those who did not have at least two of the predetermined parameters for the study, which would make comparative analysis impossible.

A typical complaint was pain or discomfort, associated or not with swelling in the inguinal region. We considered physical examination positive in patients with enlarged superficial inguinal ring and/or Valsalva positive maneuver. Ultrasound was positive when reporting the presence of inguinal hernia in its conclusion.

We used the Kappa and McNemar tests for statistical analysis, aiming to study, respectively, the concordances and disagreements of the USG with complaints, physical examination and intraoperative findings, with a significance level set at $p<0.005$. Each analysis added two diagnostic instruments separately and independent of the others, confronting an ultrasound report with a typical complaint, with physical examination and intraoperative findings, and each comparison did not contain all patients due to medical charts incompleteness.

This work was submitted to the Ethics in Research Committee of the Santo Amaro University, and approved under the opinion nº 2,699,664.

RESULTS

We analyzed 232 patients with 291 hernias in total. Of these, 93.1% were male and 6.9% female. The age ranged from 14 to 88 years, with a mean of 49.5. In 46 cases, we were able to compare USG with typical complaints or their absence (Table 1). Among those with typical complaints, 24 (52.17%) had hernias confirmed by the USG and 14 (30.43%) showed no hernia at USG reports. Eight patients (17.39%) without complaints had positive ultrasonographic examination for inguinal hernia and no patient without complaint had normal USG. When applying the Kappa statistical test, we found a significant agreement between complaints and ultrasound examination (Kappa=0.284 / p=0.019).

The McNemar test (p=0.286) did not show statistical significance between the disagreements. The highest proportion of patients with typical hernia repair without a confirmatory USG (30.43%) in relation to the presence of ultrasonographic hernia in the absence of complaints (17.39%) was not significant (Table 1).

In 56 cases, we could compare the USG with the physical examination (Table 2). In 34 (60.71%) patients, USG confirmed the inguinal hernia diagnosed at physical examination, and in 16 (28.57%) the USG did not show inguinal hernia. The USG identified five cases (8.93%) of hernias not confirmed by the physical examination. One (1.78%) patient with negative physical examination and negative USG underwent TC and surgery, the latter detecting the presence of hernia. Data submitted to statistical analysis using the Kappa method showed that the agreement did not present statistical significance (Kappa: 0.084; p=0.221). The McNemar test, on its turn, showed that the percentage of patients who presented a hernia at the physical examination not confirmed by ultrasound (28.57%) was higher than the percentage of hernias identified only by the complementary examination (8,93%), with significance (p=0.0291) regarding the disagreement between these parameters (Table 2).

To compare the intraoperative findings with the ultrasound ones, we selected 52 cases of hernias, as shown in table 3. Thirty-five patients (67.30%) with positive sonographic examinations had their hernias confirmed intraoperatively, and 17 (32.70%) with negative USG for hernia had the condition established during surgery. There was no patient without hernia undergoing surgery. It was not possible to evaluate the agreement between the items selected by the Kappa test. The McNemar's test showed that the percentage of patients operated for hernia with negative USG (32.70%) was higher than that of patients with hernia at

Table 1. *Concordance and discordance between ultrasound and typical complaints of the patient's hernia.*

USG[#]	With complaint (%)	No complaint (%)	Total
With hernia (%)	24 (52.17%)*	8 (17.39%)	32 (69.56%)
Without hernia (%)	14 (30.43%)	0 (0.00%)*	14 (30.43%)
Total	38 (82.60%)	8 (17.39%)	46

*[#]USG: ultrasonography; *at statistically significant.*

Table2. *Concordance and disagreement between ultrasound and findings on physical examination.*

USG[#]	PE[##]compatible (%)	PE[##]not compatible (%)	Total
With hernia (%)	34 (60.71%)	5 (8.93%)*	39 (69.64%)
Without hernia (%)	16 (28.57%)*	1 (1.78%)	17 (30.35%)
Total	50 (89.28%)	6 (10.71%)	56

*[#]USG: ultrasonography; [##]PE: physical exam; *statistically significant.*

Table 3. *Concordance and disagreement between ultrasound and intraoperative findings.*

USG[#]	Presence of hernia IO[##](%)	Absence of hernia IO[##](%)	Total
With hernia (%)	35 (67.30%)	0 (0.00%)*	35 (67.30%)
Without hernia (%)	17 (32.70%)*	0 (0.00%)	17 (32.70%)
Total	52 (100%)	0 (0.00%)	52

*[#]USG: ultrasonography; [##]IO: intraoperative; *statistically significant.*

ultrasound but unidentified intraoperatively, with statistical significance (p=0.001).

DISCUSSION

The prevalence of men in relation to women found in the sample studied is consistent with the world literature. The typical complaints and/or physical examination were more accurate to identify inguinal hernias than ultrasound. In view of this scenario, the need for requesting this complementary examination is doubtful, since the clinic is sovereign.

Several radiological techniques were developed to solve the difficulty of differential diagnosis of inguinal hernias. The first method described was herniography, described for the first time in 1967, in Canada and, as an invasive technique, involving the use of intraperitoneal contrast injection, with risks of severe complications, is in disuse[10,11].

The diagnosis of clinically hard-to-identify inguinal hernias is currently with the aid of USG, which is corroborated by Alabraba *et al*.[12] and the European Hernia Society[5]. This technique is inexpensive, non-invasive and practically risk-free. In addition, it is a dynamic mode that allows a comprehensive evaluation at the time of the image and does not involve radiation. However, it has the disadvantage of being operator-dependent[13]. Some studies with patients with typical inguinal hernia showed that the USG and CT might have their sensitivities overestimated[13]. Diagnosis by means of physical examination in such cases should be considered sovereign, and may exclude the image examination.

According to Miller *et al*.[9,13], Pawlak *et al*.[14], and Mathews *et al*.[15], CT and MRI are additional options for the diagnosis of inguinal hernias. Although they have good sensitivity and specificity, both modalities depend on the availability of resources. An European study led by Mathews[15] proposed that in patients with normal or doubtful clinical examination, the USG can be considered valid for diagnostic elucidation. If the USG findings are normal, these patients may be treated with outpatient follow-up if all necessary clarification is provided.

According to Miller *et al*.[9], and consistent with our results, conclusive physical examination for inguinal hernia lacks any preoperative imaging examination. In cases where the physical and imaging tests do not diagnose a hernia and the patient maintains complaints of inguinal and/or pelvic pain, Fitzgibbons *et al*.[6] recommend the "watchful waiting", that is, the outpatient follow-up, an idea with which we agree. Miller *et al*.[9] propose MRI in patients with suspected inguinal hernia without typical physical examination. Pawlak *et al*.[14] recommend the "wait-and-see approach", in which the patient is followed as to the clinical evolution, as a safe and valid modality for patients under 50 years old, ASA 1 or 2, and with symptoms for more than three months.

Phillips *et al*.[16] agree that the USG does not confer additional benefit in patients with clinically diagnosed inguinal hernia and does not change the conduct. They consider the surgical exploration unnecessary by the influence of only positive ultrasound results, which can lead to injury to the patient, such as chronic pain. According to the author, the use of ultrasonography is suitable in cases of recurrent hernia, in the differentiation of direct hernia with presence of lipoma, and local lymph node.

Miller *et al*.[9] and Pierce *et al*.[11] also advocate the use of imaging in cases of hidden hernias.

Access to relevant complaints and to the physical examination of the patient associated with the evaluation of the imaging test resulted in an accuracy of 90%, whereas the isolated evaluation of the image by the radiologist had an accuracy of 35%. The European Consensus[5], as well as the work of Miller *et al*.[9], propose that, in cases of diagnostic doubt, intermittent or non-evident bulging on physical examination, or even inguinal pain without bulging, an image examination should be performed. They also add that in obese patients, regardless of gender, or with multiple hernias, physical examination alone can lead to diagnostic errors.

Niebuhr *et al*.[17], on the other hand, state that physical examination alone, with specificity and sensitivity of 74.5% and 96.3%, respectively, should not be considered sufficient to diagnose inguinal hernia, disagreeing with the results described in the present study. The authors also advocate performing the image examination in a dynamic, standardized fashion, and in specialized centers. Bradley *et al*.[10], also in disagreement with our findings, advocate the use of USG to diagnose inguinal hernias. They cite the possibility of performing the examination in a dynamic context (cough, Valsalva maneuver), which increases accuracy when compared with other imaging tests. Lee *et al*.[18] affirm that the ultrasound has high accuracy in the diagnosis of hernia, including differentiating the type of hernia in patients with doubtful diagnosis.

In the studied population, we observed that ultrasound, often considered important for the diagnosis of hernias, may be a complementary examination with no impact on the patient's propaedeutics. The data showed that patients with typical complaints and physical examination compatible with inguinal hernia did not present conduct changes after the USG. Therefore, anamnesis and physical examination should be valued during propaedeutics for diagnostic elucidation.

The analysis of our results and the researched literature allowed us to conclude that ultrasonography was an unnecessary test in patients with typical complaints and physical examination compatible with inguinal hernia. In cases of doubt, ultrasound did not help the diagnosis. We believe that new prospective studies and other imaging methods should be performed to determine the best imaging methods in cases of diagnostic doubt.

R E S U M O

Objetivo: *avaliar a acurácia da ultrassonografia no diagnóstico de hérnia inguinal no pré-operatório de pacientes submetidos à herniorrafia inguinal.* **Métodos:** *estudo retrospectivo descritivo, analítico, baseado em dados obtidos dos prontuários de pacientes submetidos à herniorrafia inguinal entre janeiro de 2016 e dezembro de 2017 e que realizaram ultrassonografia no período pré-operatório. A amostra foi composta por 232 pacientes e foram comparados os resultados da ultrassonografia com as queixas, exame físico e achados intraoperatórios desses pacientes.* **Resultados:** *a ultrassonografia apresentou concordância com a queixa de hérnia inguinal em 52% dos pacientes (p=0,019). Houve discordância entre a porcentagem de pacientes que apresentaram hérnia ao exame físico não confirmada pelo exame ultrassonográfico (28,57%) e a porcentagem de hérnias identificadas somente ao exame complementar (8,93%), com significância estatística (p=0,0291). Quando comparados os resultados ultrassonográficos com achados intraoperatórios, 32,70% dos pacientes que apresentavam hérnia tinham ultrassonografia normal com significância estatística para discordância (p=0,001).* **Conclusão:** *a ultrassonografia mostrou-se método não confiável para auxiliar no diagnóstico em casos duvidosos de hérnia inguinal e dispensável quando o diagnóstico era confirmado por queixas típicas e exame físico compatível.*

Descritores: *Hérnia Inguinal. Diagnóstico por Imagem. Ultrassonografia. Herniorrafia.*

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