

VOLUMETRIC CLASSIFICATION OF INGUINOSCROTAL SWELLINGS

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ABSTRACT

Background: External hernias and scrotal swellings are diverse in presentation and are described in many subjective ways.

Aim: To create an objective classification of inguinoscrotal swellings in the rural setting.

Patients and methods: It was a prospective study on the measurement of inguinoscrotal swellings volume/contents in a cohort of surgical patients in a provincial general hospital in the north of Sierra Leone over a three-year period. For inguinal hernias and other scrotal swellings, the volume ranges of 0- 500ml were used in the classification; for femoral and other external hernias which generally do not reach ‘huge’ sizes, the volume ranges of 0-100 ml were used.

Results: A total of 962 external hernias and hydroceles were classified over a 3-year period. Most, 610 (63.4%) were inguino-scrotal hernias, others were hydroceles, 303 (31.0%) and femoral hernias, 42 (4.3%). The remaining small number consisted of umbilical (4) and epigastric (3) hernias. For the common conditions of hydroceles, inguinal and femoral hernias, about 50% were ‘small’, more than 40% were ‘large’, the rest were giant. The same findings were true for epigastric and umbilical hernias.

Conclusion: Using the scale that we adopted, majority of the groin hernias and hydroceles were in the small and large categories with a few giant varieties. Volumetric-based classification of hernias and hydroceles can help surgeons communicate more clearly based on standard rather than arbitrary ascription of descriptive terminologies to these very common surgical entities.

Keywords: Volumetric classification, External Hernias, Scrotal swellings

INTRODUCTION

Inguinal hernia is a common surgical disease that is often ignored by patients in most of Africa. Many avoidable deaths occur almost daily in remote rural communities across Africa due to lack of adequate surgical care for complications arising from inguinal hernia disease.¹ Adult hydroceles are also quite common with an incidence of up to 28% in some populations and the associated economic burden involved with their treatment can be significant in these mostly poor resource economies.² A study compared inguinal hernias in a West African population with those in a developed country and found that 67% and 6% of the hernias were inguinoscrotal respectively.³

More than 20 million inguinal hernias are repaired every year around the world and specific rates by country vary from 100 to 300 per 100 000 population per year⁴. The hernia surgery output from Africa is

unknown but estimates indicate an average need of 175 inguinal hernia repairs per 100 000 population per year out of which only 25 are actually performed⁵. Therefore, many hernias end up not repaired or if repaired, repair is done under emergency conditions^{1,5}. It has also been noted that many men die from complicated hernias, something that should be unheard of in the 21st century.¹

A nationwide surgical survey in Sierra Leone indicates that groin masses present a major burden of disease in the male population with an estimated prevalence of 7.01% for groin hernias¹⁹, which corresponds to a rate of 7,010 per 100,000 men and extrapolates to over 200,000 males with hernia in the country. Most of these were found in patients with jobs involving manual labour and strenuous lifting. Up to 70% of employed individuals in Sierra Leone work in

agricultural setting and engage in lifting of heavy weights, which may explain the high burden of the disease and this is also true of other West African countries.^{6,7}

External hernias in general and inguino-scrotal swellings in particular, in developing countries, reach 'huge' dimensions before the patient seeks surgical treatment. Although, swellings bigger than the human head have been designated 'giant' yet the adjectives used to describe the intermediate sizes are not standardized.²⁰ As such, someone's idea of 'large' might be completely different from another's.⁸ Several hernia classification systems have been developed to guide the surgeon in hernia repair and to ease comparison between the different techniques of hernia repair. Halverson and McVay grouped groin hernias in four classes: small indirect inguinal hernia, medium indirect inguinal hernia, large indirect and direct inguinal hernia, femoral hernia.⁹ Gilbert classified hernias based on anatomic and functional aspects according to intraoperative findings, like presence or absence of the peritoneal sac, the size of the internal ring, and the status of the posterior wall.¹⁰ Nyhus classification emphasizes the anatomic criteria including the size of the internal ring and status of the posterior wall.¹¹ Others include the Aachen and the Zollinger's classifications. Common to all classifications is the fact that they use the size of the hernia and the status of the posterior floor and/or the internal ring to describe the hernia.¹² However, these classifications are all subjective. Larger hernias are generally assumed to be more severe.

It may be useful to classify hernias by volume as it is frequent to see patients with large inguinoscrotal swellings in West Africa. Certain factors such as incidence of post-operative morbidity, length of stay in hospital, and even management, bear some relationship to the size of the lesion.²¹ Therefore, we embarked upon a volumetric classification of inguinoscrotal swellings to confer quantitative values to the descriptive terms commonly ascribed to them, in order to minimize ambiguity and to establish a common ground of understanding when referring to their sizes.

MATERIALS AND METHODS

This was a prospective study of adult patients aged between 18-75 years presenting at General Hospital, Port Loko in the northern province of Sierra Leone with inguino-scrotal swellings and other external hernias over a 3-year period (February 2019- February 2022). The hospital is a provincial 100-bed hospital providing general medical (including paediatric) and surgical (including obstetrics and gynaecology) services to a population of 500,000 Sierra Leoneans living and

working within a 30-mile radius of Port Loko town. The dominant occupation is agrarian farming.¹³

The procedure consisted of devising appropriate means of measuring the volume of the contents of hernia sacs and scrotal swellings that were retrieved at surgery. The measurements were used to quantify the pathologies into three size categories: small, large and giant (Table 1). All the surgical operations and the measurements took place in the operating room. Most of the surgical procedures were performed by the operating surgeon and were performed under either spinal or local anaesthesia.

In hernias, the sac was exposed through a suitable incision, emptied, dissected free and isolated. Artery forceps were applied to the fundus and the sac was stretched upright. It was viewed against the light to ensure that it was completely empty. Without opening it, the sac was twisted and transfixed at the neck with non-absorbable suture material and transected one centimetre distal to the suture. The specimen (the sac) was kept in a kidney dish.

On concluding the operation, the artery forceps were removed and reapplied to the cut end and the sac was filled with water. The maximum amount of fluid it was capable of holding was measured using calibrated syringes and this volume was used in the classification. The method was abandoned where it was impracticable and such patients excluded from the study examples of such were when in doubt about the complete emptiness of the sac after the reduction manipulations; in strangulation, where of necessity the sac had to be opened; in some sliding hernias; and in other instances in which the sacs were not excised but their contents were reduced only. In these circumstances, an estimate of the volume was made and classification effected accordingly.

In the case of a hydrocele, the sac, having been exposed through a suitable incision, was punctured with a trocar and cannula; the trocar was withdrawn and the fluid drained completely and measured.

We used higher volume categories to classify inguinoscrotal hernias and hydroceles that are large and grotesque; smaller volume scales were applied to femoral and other ventral hernias because of their generally smaller sizes.

RESULTS

Figure 1 shows that a total of 962 hernias and hydroceles were classified over a 3-year period. Most, 610 (63.4%) were inguino-scrotal hernias, others were hydroceles, 303 (31.0%) and femoral hernias, 42 (4.3%).

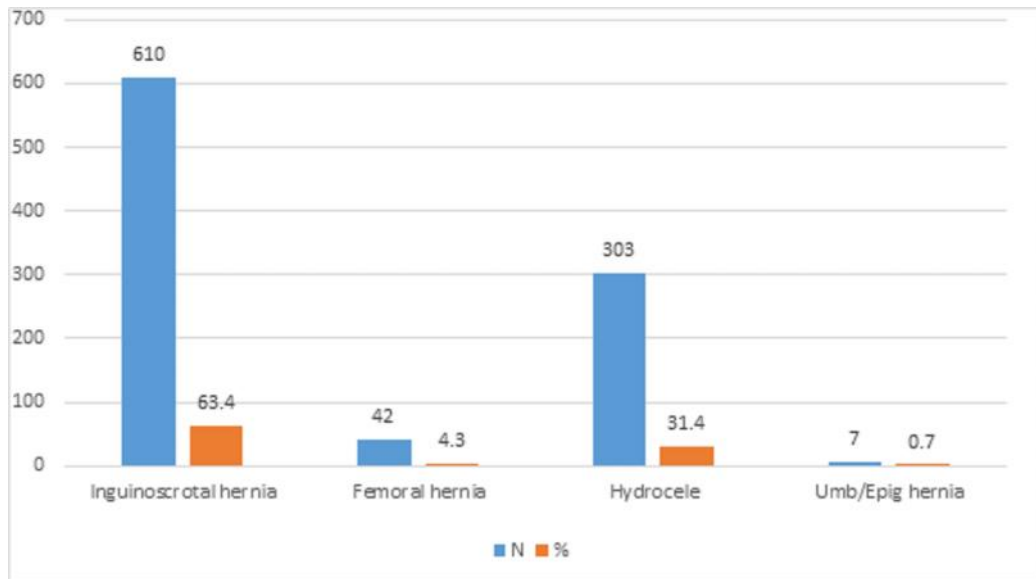


Figure 1: Distribution of inguino scrotal swellings over a 3-year period

Umb- Umbilical , Epig- Epigastric

The remaining small number consisted of umbilical (4) and epigastric (3) hernias. Table 1 shows the volumetric classification used in the study.

Table 1: Adopted dimensional classification of hernias and scrotal swellings

Description	Volume in ml.		
	Small	Large	Giant
Inguinal Hernias and Other Scrotal Swellings	0 - 500	501 - 2000	Over 2000
Femoral Hernias and Other External Hernias	0 - 100	101 - 400	Over 400

Classification of Hernias

Tables 2 and 3A depict the classification of inguino-scrotal and femoral hernias respectively. Of the 610 inguino-scrotal hernias, most, 313 (51.3%) were classified as small (i.e. the volume of the sac content was 500 ml and below); 284 (46.6%) were large (i.e. sac volume was 501 – 2000 mls); and 13 (2.1%) were

Table 2: Classification of inguino-scrotal hernias

Description	Volume in ml.	Number	%
SMALL	0 - 500	313	51.3
LARGE	501 - 2000	284	46.6
GIANT	Over 2000	13	2.1
TOTAL		610	100%

Table 3A: Classification of femoral hernias

Description	Volume in ml.	Number	%
SMALL	0 - 100	22	53
LARGE	101 - 400	17	40
GIANT	Over 400	3	7
TOTAL		42	100%

giant with sac volume of more than 2000 ml. The classification of the femoral hernias was similar to that for inguino-scrotal hernias. Small femoral hernias were 22 (52.4%), i.e. sac volume was 0 – 100mls; 17 (40%) were large with a sac volume of 101 – 400ml. Only 3 (7.1%) were giant hernias. Figure 3B shows the classification of the seven other ventral hernias in the study.

Table 3B: Classification of other ventral hernias

Description	Volume in ml.	Hernia type	Number	%
SMALL	0 - 100	Epigastric	3	42.8
LARGE	101 - 300	Umbilical	3	42.8
GIANT	301 - 400	Umbilical	1	14.4
TOTAL			7	100

Table 4: Classification of hydroceles

	Volume in ml.	Number	%
SMALL	0 – 500	162	53.4
LARGE	501 – 2000	125	41.3
GIANT	Over 2000	16	5.3
TOTAL		303	100%

Classification of Hydroceles

There were 303 hydroceles. The pattern of findings in patients with inguino-scrotal, femoral and hydroceles were similar. The majority of the hydroceles were small, 162 (53.4%). 125 (41.3%) were large, while the remaining 16 (5.3%) were classified as giant hydroceles.

DISCUSSION

In this study, we have proposed a classification of external hernias and scrotal swellings based solely on the volume of their contents for easy use and comparison in routine surgical settings. Using our metric for classification, the majority of the inguino-scrotal, femoral and other ventral hernias in our series were either small or large. This was also true for hydroceles. Our study showed that an intraoperative method of measuring the hernia or hydrocele volume can be used to classify these swellings in an objective and simple way.

This can improve communication between surgeons as it provides measurable quantifications and avoids ambiguities in the use of descriptive terminologies. Although more attuned to perioperative and post-operative usage, it may also help with decisions as regards operative techniques and the types of anaesthesia as experience is acquired over time with its usages this classification can show preoperatively the size based on the location. For example this can help to decide whether to use open or laparoscopic techniques and tension or non-tension repairs based on size. It can also help to predict pulmonary complications following surgery.¹⁴

Since Hasselbach classified inguinal hernias into direct and indirect based on their relation to the inferior epigastric vessels, several classification systems for inguinal hernias have been postulated. In spite of the availability of these classification systems, surgeons in developing countries have not universally adopted them in routine usage partly because of their inherent local limitations and the cohorts of their patients with regards to hernia sizes. It is believed that certain inguinal hernia repairs almost always have a good result, hence identifying the patient with a high risk of failure or recurrence becomes important¹⁵

The primary purpose of a classification system for any disease is to stratify for severity so that reasonable comparisons can be made between various treatment strategies.¹⁶ While clinical measurements can be made with calipers with the patient in upright position, radiological imaging like ultrasonography and computerized tomography are more accurate especially for bigger hernias. In places where these are not available, a volumetric classification system may be useful in this regard. A Turkish study introduced an objective classification system for inguinoscrotal hernias based on volume as calculated using computerized tomography and proposed a surgical treatment strategy based on this system.¹⁷ The challenges with access to radiological imaging in rural areas of developing countries have been well stated.¹⁸ Hence, an intra-operative volume estimate will be handy in the rural developing settings where computerized tomography or other imaging techniques are not available.

One drawback of our technique is its rather limited pre-operative application and usefulness. However, correlations between our method and the traditional clinical measurements (done with tape measure while the patient is standing) can be done so as to remove the need for this on-table assessment every time since this can be cumbersome. Hopefully, future research endeavours will clarify this and other relevance of this work. The correlation will help with preoperative stratification of patients and hence better surgical planning.

CONCLUSION

In this study, we did a volumetric classification of inguinoscrotal swellings and other external hernias by measuring the volume of the contents of these swellings in a cohort of surgical patients that were operated in a provincial general hospital in the northern part of Sierra Leone. Using the scale that we adopted, majority of the groin hernias and hydroceles were in the small and large categories with a few giant varieties. The essence of this study was to assign a more uniform categorization that is based on standard rather than arbitrary ascription to these very common surgical entities in our clinical setting and practice. Volumetric-based classification of hernias and hydroceles can help surgeons communicate more clearly and lead to more objective choices of surgical procedures.

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