

A CLINICAL STUDY OF VARIOUS PATTERNS OF ABDOMINAL WALL HERNIA WITH SPECIAL EMPHASIS ON INGUINAL HERNIA AND IT'S CORRELATION WITH PRE-OPERATIVE ULTRASONOGRAPHY AND INTRAOPERATIVE FINDINGS AT TERTIARY CARE CENTRE

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ABSTRACT

Objective: Various presentations of abdominal wall hernia and their clinical correlation to preoperative ultrasonography report and intraoperative findings.

Methods: Fifty consecutive patients were admitted to the Department of General Surgery at PMCH, Udaipur, during January 2021–June 2022, with a mean follow-up period of 18 months. The patient's particulars, elaborate h/o complaints, clinical examination, investigations, procedure done, and post-operative complications were recorded.

Results: Maximum cases reported had a right inguinal hernia, hence right inguinal hernioplasty was performed in 46% of cases, followed by left inguinal hernioplasty in 32%, bilateral inguinal hernioplasty in 14%, and epigastric and mesh hernioplasty in 4% each. The judgemental accuracy and of ultrasound (USG) had sensitivity of 86.96%, specificity of 100.00%, and accuracy of 88.00%. Intraoperatively, 92% of sonography findings were confirmed. In only six cases, the findings differed from ultrasound.

Conclusion: High-resolution sonography is an accurate diagnostic imaging modality in anterior abdominal wall lesions. The advantages of high-resolution sonography include noninvasiveness, high accuracy, lack of ionizing radiation, simplicity, wide availability, cost-effectiveness, and repeatability.

Keywords: Inguinal hernia, Hernioplasty, Ultrasound, Incisional hernia.

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INTRODUCTION

An abdominal wall hernia is the abnormal protrusion or bulging of part of the contents of the abdominal cavity through a weakness in the abdominal wall. Many hernias are asymptomatic, but some become incarcerated or strangulated, causing pain and requiring immediate surgery. These hernias typically present as a swelling, and complications such as strangulation and incarceration rarely occur along with their corresponding manifestations [1].

About 75% of all abdominal hernia are inguinal hernia. Incisional hernias comprise another 10–15%. Femoral and unusual hernias account for the remaining 10–15%.

Inguinal hernia is the most common surgical condition seen over all age groups and surgery is the only treatment in all cases, conservative treatment has no role in the present era. A hydrocele is an abnormal collection of serous fluid in between two layers of tunica vaginalis. It is divided into congenital and acquired in acquired it is either primary or secondary. Secondary hydrocele occurs secondary to disease of the testis and epididymis and its management mainly consists of treatment of the underlying cause [2].

Inguinal hernia repair is one of the most common procedures performed all over the world in adults. The lifetime risk of developing an inguinal hernia has been estimated at 27% for men and 3% for women [3].

There are two basic types of inguinal hernia that are fundamentally different in anatomy, causation, and complications.

1. Direct inguinal hernia (Lateral, oblique): Mostly acquired
2. Indirect inguinal hernia (Medial, sliding): Mostly congenital.

In general, due to easy recognition as a palpable mass in the groin region, patients seek for doctor's consultation. Usually, it is not a life-threatening condition that may be successfully treated with the surgical manipulation. The emergency operation is necessary in cases of strangulation due to the possible complications such as intestinal necrosis, diffuse peritonitis, and septic shock. The "wait and watch" strategy may be applied when it refers to minimally symptomatic or totally asymptomatic, patient's fat may act as a barrier against protrusion of the hernia sac [4].

Patients with increased serum levels of matrix metalloproteinase 2 and matrix metalloproteinase tissue inhibitor 2 comparing to the general population are also at higher risk of developing hernia. External risk factors are identified with cumulative exposures to daily lifting activities (total load, frequent heavy lifting) and prolonged standing and walking.

Hence, the study was conducted to find the various presentations of abdominal wall hernia, including inguinal hernia in southern Rajasthan. To find a clinical correlation of their preoperative ultrasonography report findings with their intraoperative findings.

METHODS

Source of data

The study was conducted on 50 consecutive patients admitted to the Department of General Surgery at Pacific Medical College and Hospital, Udaipur, Rajasthan after taking proper approval from the institutional ethical committee.

During the period

January 2021–June 2022, with a mean follow-up period of 18 months.

Patients of either sex/age between 16 years and 80 years and patients who are willing to get operated were included in the study.

Patients who have testicular neoplasm's, patients with obstructed hernia, patient with incarcerated hernia, refusal to give consent or who were uncooperative, patient who opted out from surgery, and patient with infective conditions such as epididymorchitis were excluded from the study.

The patient's particulars, elaborate h/o complaints, clinical examination, investigations, procedure done, and post-operative complications were recorded in a specially designed Pro forma. The pro forma also includes surgical intervention which the patient underwent during the hospital stay.

Patients were followed up in regular surgery outpatient department when they came for review and the points that are of special importance such as detailed clinical examination of the operated site, any surgical site infection, any recurrence in long term is usually followed by ultrasound (USG) abdomen, pelvis, and scrotum.

The patients were randomized to undergo the various surgical procedures depending on the age, presentation, tone of the abdominal muscles, and affordability of the patient for the operative procedures.

Post-operative care and complications

- All patients underwent careful postoperative monitoring for pain, bleeding, and wound infection.
- Using a verbal analog scale, the pain was evaluated.
- An infection of a wound could range from a minor pus discharge from a single cutaneous suture to a severe and invasive process requiring a lengthy hospital stay and intravenous antibiotics.
- Subcutaneous hematoma, which can happen as a result of slack ties, was used to define bleeding and discharge.
- After 1 month, 3 months, and 6 months, the patients were released from care and asked to return for routine follow-up.
- With many dropouts, different patients were monitored for varying lengths of time.

The patients were advised to return to pre-hernia lifestyle.

- All were followed up for post-operative pain, interference with activities of daily living, use of analgesics and recurrence.
- The age/sex incidence, mode of presentation, precipitating factors, surgical treatment, post-operative complications were all evaluated and compared with standard published literature.
- The data were transferred to a master chart which was then subjected to statistical analysis. The follow-up investigations and management were also recorded in the data.

Data analysis

All relevant details including history, and general clinical examination findings were recorded in case reporting form. A database was constituted using SPSS version 22 and electronic Microsoft Excel spreadsheets to store and manage the collected data. Categorical data have been represented as frequency (number) and proportions (percentages). Continuous data have been presented as mean+standard deviation. For the analysis of data, the student "t" test and Chi-square tests were used. $p < 0.05$ was considered statistically significant.

RESULTS

The most common age group involved was 41–70 years accounting for 54% of patients. Whereas 6% was the incidence in the 31–40 years age group.

In this study, all the cases were male where as it was not seen in females.

As maximum cases reported had a right inguinal hernia, hence right inguinal hernioplasty was performed in 46% of cases, followed by left

inguinal hernioplasty in 32%, bilateral inguinal hernioplasty in 14%, and epigastric and mesh hernioplasty in 4% each.

Sensitivity 86.96%, specificity 100.00%, accuracy 88.00%, intraoperatively, 92% of sonography findings were confirmed. In only six cases, the findings differed from USG.

DISCUSSION

This present study was undertaken to compare with other such studies to assess the accuracy of ultrasonography with that of intraoperative findings of hernias. Fifty cases of abdominal wall hernia including inguinal hernia were taken in this study during the period between January 2021 and June 2022.

In our study, there were 50% cases of right-side inguinal hernia and 34.78% left-sided inguinal hernia. A total of 15.22% cases of bilateral hernia were observed. Out of four patients of abdominal wall hernia, 2 (50%) presented with epigastric, 1 (25%) each of incisional, and para umbilical hernia.

Yelkur, in their study, reported 67.40% of cases with right-side inguinal hernia, 27.62% with the left side, and 4.98% with a bilateral hernia. They reported 80.66% of cases with inguinal hernia in their study. In their series, nine were irreducible, four were obstructed hernias, and two were strangulated hernias, two had undergone malignant change [5].

Sachin reported 81% inguinal hernia in their study. Out of them, 43.20% were right-sided, 34.56% were left-sided, and 22.24% were bilateral hernia [6].

In our study, all patients who had inguinal hernia complaint of swelling. 8.69% of cases of inguinal hernia had both pain and swelling.

Yelkur, in their study, reported that 19% of cases with inguinal hernia having pain as the only complaint, 82% had swelling as main symptom, whereas 16% had both pain and swelling as their main symptom [5].

Raghavendra showed that out of 68.33% of inguinal hernia in their study 76% had swelling as the main complaint. Pain and swelling both in 14.56% and only pain in 9.5% of cases [7].

Sachin reported that 55.6% of inguinal hernia patients having swelling as the main complaint. About 45.4% had both pain with swelling [6].

Sreekant in his study showed that ventral hernia in 35/60 cases (58.3%) of incisional hernia, 8/60 cases (13.3%) of epigastric hernia, 6/60 cases (10%) of umbilical hernia, and 11/60 cases (18.3%) of paraumbilical hernia. There were no cases of spigelian hernia or divarication of recti among the 60 cases [8].

Bose *et al.* stated in their study out of 175 cases, 110 were incisional hernia (62.86%), 12 were umbilical hernias (6.85%), 32 cases were paraumbilical hernias (18.28%), and 21 cases were epigastric hernia (12.0%) [9]. The incidence of the different types of ventral hernia matches with that of the S. M. Bose study. There was no case of spigelian, divarication of recti in both the studies [9].

In our study, out of four patients with abdominal wall hernia, 2 (50%) presented with epigastric, 1 (25%) each of incisional, and paraumbilical hernia.

Pain was reported by 26.7%. In every single case, the anterior abdominal wall swelled.

The most common presenting complaint was painless swelling followed by painful swelling. In most of cases, noticeable pain appears in swelling, symptoms were more on the right side compared to the left, and 7 bilateral cases were included in the respective groups right or

left as default by the software and thus making the total more than 100. In our study, patients with bilateral hernia had pain with swelling in 12.5% of cases, whereas 100% of them reported with swelling.

On USG, in this study, 50% of cases had indirect inguinal hernia, followed by 42% of direct inguinal hernia, 4% of epigastric hernia, and 2% each of incisional and paraumbilical hernia.

In our study, as the maximum cases reported had right inguinal hernia, hence right inguinal hernioplasty was performed in 46% of cases, followed by left inguinal hernioplasty in 32%, bilateral inguinal hernioplasty in 14%, and epigastric and mesh hernioplasty in 4% each.

In our study, 24% of patients had post-operative pain during hospital stay, which was treated with regular Oral and IV analgesics, rest of 76% of patients were without any pain at the time of discharge.

In this study, the most common post-operative complication during a hospital stay was wound infection, followed by hematoma, 94% of patients were discharged without any complications.

In our study, the wound infection in 1 (2%) case stayed longer in the hospital with a course of injectable antibiotics to counteract with the infection, and regular dressings and timely secondary suturing in cases with wound gaping. For the wound infection 3rd day pus/discharge was sent for culture and sensitivity, it revealed staphylococcus aureus.

Sreekant observed similar findings in their study [8]. A maximum number of patients had a history of wound infection following previous surgical procedure (60%). This is similar to the Bose *et al.* who reported (53.63%) wound site infection as the most common complications in hernia surgery due to dressing and suture gaping [9]. Sachin reported wound infection as post-operative complication in 9.87% of patients, it is comparable to other studies in which the reported rate was 1.4% [6].

In our study, the average duration of hospital stay was 12.90±16.93 days. The minimum stay was only for 2 days and in 1 case the duration of hospital stay was extended to 21 days due to comorbidity and post-operative infection.

Similar to ours Sreekant observed an average stay in the hospital was 11 days and the removal drain was done on the 4th post-operative day on an average. Suture removal was done on the 8th post-operative day on an average. Abdominal binders were prescribed when deemed necessary along with other follow-up instructions [8].

In only one case recurrence of hernia has been noted in follow-up period of 6 months, accounting for 2% of the recurrence rate. Sreekant reported no recurrence rate in their study. Liem *et al.* reported that 3% had a recurrence of hernia in their study [8,10].

In our study, intraoperatively, 92% of sonography findings were confirmed. In only six cases, the findings differed from USG.

Alam *et al.* assessed the accuracy of USG in the diagnosis of clinically occult groin hernia in adults and reported that USG had a sensitivity of 29% and specificity of 90% compared with the herniography. Correlation with surgical findings showed USG to have a sensitivity of 33% and a specificity of 100%. The sensitivity of USG in detecting clinically occult hernias in a non-acute presentation is poor, and patients with normal USG should be considered for further investigation [11].

Lee *et al.* showed the overall rates of sensitivity and specificity of the US for diagnosing the presence of groin hernia were 96% and 96%, respectively. These rates reflect improvements from 92% and 88% before 2011 to 98% and 100% beginning in 2011. In addition, the overall accuracy of the US for diagnosing the type of groin hernia was 96%. This also improved over time at our center from 91% before 2011 to 98% beginning in 2011 [12].

Table 1: Distribution of study subjects based on type of surgery

Type of surgery	No.	Percentage
Bilateral inguinal hernioplasty	7	14.00
Right inguinal hernioplasty	23	46.00
Left inguinal hernioplasty	16	32.00
Epigastric hernioplasty	2	4.00
Mesh hernioplasty	2	4.00
Total	50	100.0

Table 2: Sensitivity, specificity, and accuracy between USG and operative findings

	USG findings		
	Yes	No	Total
Intraoperative findings			
Yes	40	0	40
No	4	6	10
Total	44	6	50

USG: Ultrasound

Table 3: Comparison of incidence of different side of inguinal hernia

	Yelkur [5]	Raghavendra [7]	Sachin [6]	Our study
Pain	19%	9.5%	41.6%	8.69%
Swelling	82%	76%	55.6%	100%
Pain+swelling	16%	14.56%	45.4%	8.69%

Table 4: Comparison of incidence of different types of ventral hernia

	Sreekant [8]	Bose <i>et al.</i> [9]	Sachin [6]	Our study
Incisional hernia	58.3%	62.86%	35.1%	25%
Epigastric hernia	13.3%	12%	25.8%	50%
Umbilical hernia	10.0%	6.85%	17.90%	-
Paraumbilical hernia	19.3%	18.28%	21.20%	25%

Ultrasonography is an essential investigation preoperatively to avail the Chiranjeevi yojana providing free surgical management by the Rajasthan government. It also provides to be a defensive tool in medicolegal cases as our documentary evidence.

A very tool to diagnose abdominal wall hernia including inguinal hernia is high-resolution ultrasonography. It is non-ionizing and non-invasive modality.

Rajasthan government free health services like Chiranjeevi yojana, it is mandatory to get ultrasonography of hernia as a proof of diagnosis, therefore, it is essentially a tool for preoperative diagnosis. Assessment of all Chiranjeevi patients included in this study.

It is also helpful in the medicolegal aspect and in cases of recurrence for review.

The present study is undertaken to assess the feasibility of the use of preoperative ultrasonography of hernias between the period of January 2021 and June 2022.

Limitations

As this was a limited period follow-up and a small sample size, hence we are not in a position to comment on recurrence rates. Always when

good surgical procedures are adopted along with better pre- and post-operative care of comorbidities, outcome will always improve.

CONCLUSION

Good pre-operative evaluation and preparation; sound anatomical knowledge and meticulous attention to surgical detail are the most important factors for the prevention of post-operative complications and recurrence of hernia.

High-resolution sonography is an accurate diagnostic imaging modality in anterior abdominal wall lesions. The advantages of high-resolution sonography include noninvasiveness, high accuracy, lack of ionizing radiation, simplicity, wide availability, cost-effectiveness, and repeatability. The age group between 20 and 40 years had a higher prevalence of anterior abdominal lesions.

AUTHORS CONTRIBUTION

Equal contribution in all fields by all authors.

CONFLICTS OF INTERESTS

Nil

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Nil

REFERENCES

1. Townsend C, Beauchamp R, Evers B, Mattox K. Sabiston Textbook of Surgery. 20th ed. Philadelphia, PA: Elsevier; 2016. p. 1092.
2. Fowler C. Chapter 79: The testes and scrotum. In: Williams NS, Bulstrode CJ, Ronan P, Connell O, editors. Bailey and Love's Short Practice of Surgery. 25th ed. London: Arnold Publishers; 2008. p. 1377-416.
3. Goldstin M. Surgical management of male infertility and other scrotal disorder. In: Walsh PC, Retik AB, Vaughan, editors. Campbell's Urology. 8th ed., Vol. 1. Edinburgh: WB Saunders Company; 2002. p. 313-6.
4. Skoog SJ, Roberts KP, Goldstein M, Pryor JL. The adolescent varicocele: What's new with an old problem in young patients? *Pediatrics* 1997;100:112-21. doi: 10.1542/peds.100.1.112, PMID 9200369
5. Yelkur KK. Inguinal Hernia-Comprehensive Study of Incidence and Management at K.V.G Medical College and Hospital, Sullia, Karnataka; 2011-2014.
6. Sachin A. Prospective Study of Inguinoscrotal Swellings and Its Management in A Tertiary Care Hospital [Thesis] Submitted to RGHSU Karnataka, Bangalore; 2017.
7. Raghavendra M. A Comparative Study of Lichtenstein's Hernioplasty for Uncomplicated Inguinal Hernia Done under Local Anaesthesia Versus Spinal Anaesthesia. Mysore: Mysore Medical College and Mysore Research Institute; 2014.
8. Sreekant. Clinical Study of Ventral [Hernia Dissertation] [Thesis] Submitted to RGHSU Karnataka, Bangalore; 2012.
9. Bose SM, Lal R, Kalra M, Wig JD, Khanna SK. 'Ventral hernia - a review of 175 cases'. *Indian J Surg* 2017;61:180-4.
10. Liem MS, van Duyn EB, van der Graaf Y, van Vroonhoven TJ. Recurrences after conventional anterior and laparoscopic inguinal hernia repair. *Ann Surg* 2003;237:136-41. doi: 10.1097/0000658-200301000-00019
11. Alam A, Nice C, Uberoi R. The accuracy of ultrasound in the diagnosis of clinically occult groin hernias in adults. *Eur Radiol* 2005;15:2457-61. doi: 10.1007/s00330-005-2825-7, PMID 15986204
12. Lee RK, Griffith JF, Ng WH. High accuracy of ultrasound in diagnosing the presence and type of groin hernia. *J Clin Ultrasound* 2015;43:538-47. doi: 10.1002/jcu.22271, PMID 25944106