

Preoperative Infraumbilical Anthropometry: A Selective Guide to Endoscopic Hernia Repair—A Pilot Study

¹Utpal De, ²Pronoy Kabiraj

ABSTRACT

Introduction: Specific preoperative indications for endoscopic hernia repair are nonexistent. The study was aimed to examine the feasibility of preoperative infraumbilical anthropometry (PIA) as a guide to define endoscopic repair.

Materials and methods: Forty-five patients were recruited for the study based on predefined inclusion and exclusion criteria. Preoperative anthropometric measurements (fixed bony points of pelvis and umbilicus) were done. All patients were subjected to total extraperitoneal repair (TEP). Failure of TEP was converted to transabdominal preperitoneal repair (TAPP) and reasons for conversion were noted and statistically analyzed.

Results: A total of 33 patients underwent TEP (73.3%) and 12 (26.7%) patients had to be converted to TAPP. Raised body mass index (BMI) [mean 22.53, standard deviation (SD) 0.35, $p < 0.001$], increased infraumbilical fat pad thickness (mean 2.77 cm, SD 0.27, $p < 0.001$), and pelvic anthropometric parameters were found to be significant ($p < 0.001$).

Conclusion: Preoperative pelvic anthropometry could be a selective guide to endoscopic hernia repair.

Keywords: Anthropometry, Endoscopy, Hernia, Treatment.

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INTRODUCTION

A quarter of a century has passed since minimally invasive hernia surgery assumed a place in the pantheon of hernia repair. Since then, numerous studies have been published focusing primarily on intraoperative constraints and postoperative outcome.¹ During the same time frame, certain individualistic indications do seem to cry out for a hernia-specific endoscopic approach² (Table 1).

Specific preoperative patient selection criteria for a particular endoscopic technique is yet to be evolved. Transabdominal preperitoneal is considered superior to

Table 1: Indications for TAPP and TEP¹

TEP	TAPP
Primary hernia: Unilateral or bilateral	Incarceration or strangulation
Recurrent hernia following open hernia repair	Scrotal hernias
Prior abdominal surgical history—even involving midline	Inguinodynia
Open prostatectomy	Recurrence after TAPP or TEP Patients with previous Pfannenstiel incision

TEP as the available working space is more.³ But TEP has the advantages of less postoperative pain, early ambulation, and lower recurrence rate.²⁻⁴ Lack of peritoneal breach and nonfixation of mesh has led to cost-effective outcome. Though several factors have been postulated as contraindications for TEP and indications for TAPP,² none of the reports have taken into consideration PIA as a guide to endoscopic hernia repair.

Our study was aimed to explore this gray area to deduce if PIA could guide endoscopic herniologist to choose specific (TEP/TAPP) surgery for defined patients with inguinal hernia.

MATERIALS AND METHODS

The study was performed in the Department of Surgery from March 2014 to February 2015. Forty-five patients with inguinal hernia were included in the study. All the patients were admitted through the outpatient department. After proper history taking and thorough clinical examination, patients were recruited based on specific inclusion and exclusion criteria. Inclusion criteria included patients of any sex, age more than 18 years, primary, unilateral, uncomplicated, incomplete, reducible, direct or indirect, inguinal hernias.

Exclusion criteria included patients with bilateral hernia, previous lower abdominal surgery (open prostatectomy, lower segment cesarean section, appendectomy scar, and midline laparotomy scar), soft tissue tumors in the inguinal region on abdominal sonography, patients with concomitant varicocele, undescended testes, inguinal lymphadenopathy, general contraindications for laparoscopic surgery, and unwilling patients.

History taking included duration, straining factors (chronic cough, lower urinary tract symptoms, and

¹Professor, ²Postgraduate Trainee

^{1,2}Department of General Surgery, Bankura Sammilani Medical College, Bankura, West Bengal, India

Corresponding Author: Utpal De, Professor, Department of General Surgery, Bankura Sammilani Medical College, Bankura West Bengal, India, e-mail: utpalde@vsnl.net

chronic constipation), side, previous lower abdominal surgery, and proportion (medial, lateral, and scrotal). Apart from the general physical parameters, special emphasis was laid to calculate the BMI. Regional examination included the type (direct or indirect), size of deep ring, reducibility, and impulse on coughing. Per rectal examination was performed in all the patients.

For special anthropometric measurement, the infraumbilical fat pad thickness was measured in centimeters using Accu-measure calipers taking a single reading from suprapubic region midway between umbilicus and symphysis pubis. The value was then interpreted from available skin fold to body fat charts available in the market.

Other parameters measured were distance between umbilicus (U) and symphysis pubis (SP), U and anterior superior iliac spine (ASIS), interspinous distance and ASIS to SP. These were measured in centimeters with the help of calipers.

All the patients were subjected to TEP. Patients in whom TEP failed were converted to TAPP and the reasons for conversion were noted. Patients received a single dose of linezolid 600 mg at induction. Parenteral fluids were continued for 12 hours and patients were allowed normal diet thereafter.

All the patients were discharged on the 3rd postoperative day after wound dressing. Stitches were removed on the 10th postoperative day and patients were followed up monthly for 3 months and then three monthly for 1 year.

The parameters of each individual patient were statistically analyzed. Student's paired t-test was used to compare continuous variables which were normally distributed. The continuous variables that were not normally distributed were analyzed by Mann-Whitney U test, the nonparametric analog for Student's paired test. The p-value of <0.005 was taken as the threshold for statistical significance. The data were analyzed with the help of IBM Statistical Package for the Social Sciences version 22.0 (SPSS Inc., Chicago, Illinois, USA) software.

RESULTS AND ANALYSIS

The study included 45 male patients. Age ranged from 18 to 82 years (average = 44.42 years). Most of the patients (10 patients) belonged to the age group 41 to 50 years. There were 34 indirect hernias and 11 direct hernias. There were no patients with femoral hernia in the study group. Direct hernias were more common in elderly patients above 60 years of age. Nine of these patients had lower urinary tract symptoms and were treated preoperatively with tamsulosin for 12 weeks and continued postoperatively for 6 months. Patients were assessed by reduction in symptoms and reduced residual urine on sonography preoperatively. Fifteen patients had right-sided and

29 patients had left-sided inguinal hernias. Of the 15 right-sided hernias, 8 were indirect and 7 were direct hernias. Of the 29 left-sided hernias, 6 were direct and 23 were indirect hernias. The BMI of the patients ranged from 18.39 to 22.89 (average: 20.23). The suprapubic fat pad thickness ranged from 14 to 31 mm (average: 20.5 mm).

There were 10 diabetic, 15 hypertensive, and 3 hypothyroid patients. All these patients were preoperatively optimized before surgery.

The TEP was the procedure to start with and could be completed in 33 patients (73.3%), whereas in 12 patients (26.7%), TEP was converted to TAPP. The patients in whom TEP was converted to TAPP had increased BMI (mean 22.53, SD 0.35, $p < 0.001$) and subcutaneous fat pad (mean 27.75, SD 0.27, $p < 0.001$) respectively. The cause for conversion included difficulty in port insertion and creation of potential working space. Moreover, during port insertion, five patients had inadvertent peritoneal breach due to poor visualization because of excessive preperitoneal fat, resulting in pneumoperitoneum. Oozing from the dissected fat made visualization difficult due to less illumination. The remaining converted patients had less U-SP length, U-ASIS length, ASIS-ASIS length, and SP-ASIS measurements (Table 2). The narrow pelvis resulted in crowding of instruments and less freedom of movement.

Patients in whom TEP was successful had less BMI, subcutaneous fat pad thickness, and wider pelvis (Table 2).

There were no preoperative complications. Postoperative complications included seroma formation in five patients and minor port-site infection in two patients. Seroma was aspirated and patients were put on linezolid 600 mg for 10 days. Pus was sent for culture from the port sites which revealed *Staphylococcus aureus* sensitive to linezolid. Linezolid 600 mg for 10 days resulted in complete wound healing. Three patients were lost to follow-up. There was no recurrence in the rest of the patients till date.

DISCUSSION

Open inguinal hernia repair is still performed by numerous procedures and is less dependent on specific repair for specific hernia. The basic principle of repair remains the same with modification in only one step, i.e., repair and strengthening of posterior wall. Rather, the choice of operation is surgeon-centric rather than hernia-centric. Various studies claim superiority over one another. Though Lichtenstein's tension-free mesh hernioplasty is the consensus operation, still other operations continue to be practiced on a wider scale.⁵⁻⁷ Surgeons practicing a particular technique continue to carry on with a particular procedure because of more versatility with the procedure and better outcome rather than any other issues.

Table 2: Multivariate analysis of anthropometric parameters of the patients

	Type of surgery	No.	Mean	SD	"t"/M-W-U test (p-value)
BMI	TEP	33	19.400909	0.7792960	0.000* (<0.001)
	TAPP	12	22.530000	0.3529615	
ASIS-ASIS	TEP	33	24.221	0.7897	23.000* (<0.001)
	TAPP	12	22.875	0.2379	
U-ASIS	TEP	33	15.463636	0.7175558	14.000* (<0.001)
	TAPP	12	14.000000	0.1705606	
U-SP	TEP	33	15.684848	0.3977446	8.983 (<0.001)
	TAPP	12	14.508333	0.3604501	
SP-ASIS	TEP	33	14.982	0.6989	63.500* (0.001)
	TAPP	12	14.158	0.3288	
FAT PAD	TEP	33	1.791	0.1974	-13.371 (<0.001)
	TAPP	12	2.775	0.2701	

*Mann-Whitney U test done; M-W-U: Mann-Whitney U test; FAT PAD: fat pad thickness

Endoscopic hernia repair is another armamentarium in this gallery of hernia repair. Though the technical procedure is the same, the approach is different.^{2,5} Moreover, the anatomy, working space, surgeon's capability, learning curve, cost-effectiveness, complications, recurrence, and overall patients' demand, satisfaction and acceptability^{1-6,8} have placed hernia surgeons in peculiar dilemma never seen before. General surgeons performing hernia surgery in an attempt to master endoscopic repair grope hard to adhere to one or the other procedure based purely on evidences laid by surgeons practicing a particular procedure rather than appreciating the technical details which would suit them. As endoscopic hernia surgery is ergonomically driven, a particular procedure suitable and comfortable to one surgeon might not be compatible with the other. As such, the issue of learning curve³⁻⁶ for a particular procedure before promoting oneself to another procedure does not hold true. Rather, mastering one technique which ergonomically suits a particular surgeon through constant practice should be the order of the day.

Currently, there are no specific preoperative indications for endoscopic TEP or TAPP barring some anatomical hindrances.²⁻⁵ Endoscopic hernia surgeons tend to promote and propagate the repair in which an individual surgeon has garnered strength. These are mainly based on their individual technical difficulties faced during operation and postoperative outcome. Keeping in view of the above consideration, our study aimed to define some predefined anthropometric parameters^{9,10} which could guide surgeons to perform a particular endoscopic repair for each individual hernia. In other words, endoscopic repair should be individualistic rather than a generalized approach.

Our study statistically proved that patients with high BMI, increased infraumbilical fat pad, and patients with a narrow pelvis were more likely to benefit from TAPP rather than TEP. This was due to availability of more

working space, better visualization, and greater freedom of movement.

The other outcome from our study was that TEP should be the initial procedure to start with as failure still does not preclude the patient from TAPP, whereas failure in TAPP leaves the patients with the only option for open hernia repair.

Our results are also consistent with other studies as regards intraoperative complications, cost effectiveness, postoperative outcome, and patient satisfaction.¹⁻⁸

To conclude, we can say that PIA could be helpful for defining patients undergoing endoscopic hernia repair, though a larger series with more number of patients is warranted. There should be no graduation parameters of adapting from one procedure to another and it is up to the operating surgeon to decide which procedure is ergonomically beneficial to him or her.

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