

Original Research Article

Role of low-lying pubic tubercle in the development of inguinal hernia

Diwan Singh Jakhar, Joginder Singh*, Ashok Kumar, Dharmveer Jajra, Sanjay Lodha

Department of Surgery, Sardar Patel Medical College, Bikaner, Rajasthan, India

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***Correspondence:**

Dr. Joginder Singh,

E-mail: jackysingh007@gmail.com

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ABSTRACT

Background: Hernia is defined as abnormal protrusion of whole or a part of a viscus through the wall that contains it. Among all external abdominal hernias, inguinal hernia is one most commonly encountered. Many factors are responsible for the formation of the inguinal hernia but, what makes a few people more susceptible to this situation is still clearly not proved. The lowness of pubic tubercle is associated with narrow origin of internal oblique muscle from lateral inguinal ligament which fails to protect the deep inguinal ring consequently lead to inguinal hernia.

Methods: The study was conducted in Sardar Patel Medical College and attached hospital, Bikaner for duration of 12 months from March 2018 to February 2019. It is a case-control study with 50 cases and 50 control meeting inclusion criteria. In all patients, following parameters SS line, ST line, height, weight was recorded and evaluated.

Results: The mean value of ST line in our study group is 7.37 ± 0.182 cm which is significantly greater ($p=0.0001$) than the controls the mean value being 7.01 ± 0.262 cm. In our study, 98% of cases were having ST line >7.01 cm whereas 66% of controls were ST line under 7.01 cm.

Conclusions: Group of people with low lying pubic tubercle are at high risk of developing inguinal hernia.

Keywords: Anterior superior iliac spine, Inguinal canal, Inguinal hernia, Low lying pubic tubercle, Pubic tubercle

INTRODUCTION

Hernia is defined as abnormal protrusion of whole or a part of a viscus through the wall that contains it.¹ Among abdominal hernias, inguinal hernia is the most commonly encountered type. Indirect inguinal hernia is the most common of all forms of the hernia, affecting the males seven times more than the females.²

One common feature in all types of hernias is a zone of weakness through which herniation occurs. All the inguinal hernias begin within a single weak area called myopectoneal orifice. As the mankind evolved from Neanderthal man to homoerectus/ homosapiens (upright man), there is thought to be apparent lack of the evolutionary development of a strong posterior rectus sheath and transversalis fascia in lower abdomen which is thought to represent a significant specific anatomic defect.³

There are various defensive mechanisms of the inguinal canal to prevent the formation of hernia which are based on anatomical factors are obliquity of inguinal canal forming flap valve mechanism, ball valve mechanism of cremasteric muscle, slit valve mechanism and conjoint tendon at superficial inguinal ring, fleshy fibres of internal oblique muscle at deep ring. Along with above all factors, the shutter-like mechanism at the internal inguinal ring is provided by contraction of the arching fibres of the internal oblique muscle, which, when shortened, approximate themselves to the inguinal ligament and compress the spermatic cord.⁴

The lowness of pubic tubercle is associated with narrow origin of internal oblique muscle from the inguinal ligament. The narrow origin of internal oblique muscle fails to protect the deep inguinal ring and consequently indirect inguinal hernia occurs.⁵ The aim of our study is

to find out the relationship of low-lying pubic tubercle between cases and control.

METHODS

The study is conducted in department of Surgery, S. P. Medical College and associated group of hospitals, Bikaner. It is a hospital-based case-control study with total duration of 12 months. Study groups are the patients admitted in our hospital wards with symptomatic inguinal hernia without any complications. So, the sample size will be all patient with inguinal hernia admitted in Department of General Surgery, S. P. Medical College and associated general hospitals, Bikaner.

Inclusion criteria

Any case of uncomplicated inguinal hernia irrespective of sex and occupation were included.

Exclusion criteria

Out patients, hernias due to BPH/ abdominal mass/ post traumatic/ post-surgical / recurrent hernias, hernias associated with hydrocele/ undescended testes/ irreducible/ strangulated/ obstruction, patients less than 16 years, history of pelvic fracture/ anomaly/ hip surgery were excluded from the study.

The various parameters measured were SS line (distance between each anterior superior iliac spine), ST line (vertical distance between the pubic tubercle of affected side) and the SS line (SS/ST, height, weight, BMI, height/ST, weight/ST).

The data collected was entered into Microsoft office excel. An attempt was made to find any relationship between ST Line and SS Line measurement and height, weight, BMI, age and side of hernia of the patient. The statistical package used was SPSS 17.

RESULTS

In our study, there was 50 cases and 50 controls. Among them the average SS line value for case was 23.11 ± 0.233 cm which is significantly greater ($p=0.0001$) than the average in control group which was 22.84 ± 0.225 cm. The mean value of ST line in our study group is 7.37 ± 0.182 cm which is significantly greater ($p=0.0001$) than the controls the mean value being 7.01 ± 0.262 (Table 1, Figure 1).

Age

The patient with age more than 16 years are chosen. The lowest age was 16 years and highest age was 70 years. The distribution of cases is shown in the table below, the highest incidence was noted in 60-70 age group with 26%. The lowest incidence 10-19 age group with 6% (Figure 2).

Table 1: Comparing SS, ST lines of cases with controls.

SS line (cm)	N	Mean (cm)	Std Deviation	P value
Cases	50	23.11	0.233	0.0001
Control	50	22.84	0.225	0.0001
ST line (cm)				
Cases	50	7.37	0.182	0.0001
Control	50	7.01	0.262	0.0001

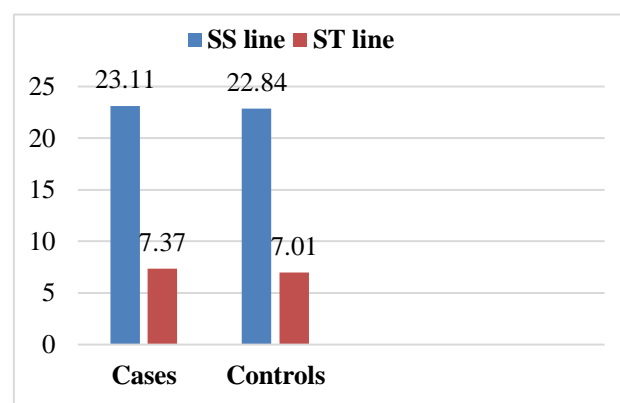


Figure 1: Graphical representation of SS, ST line.

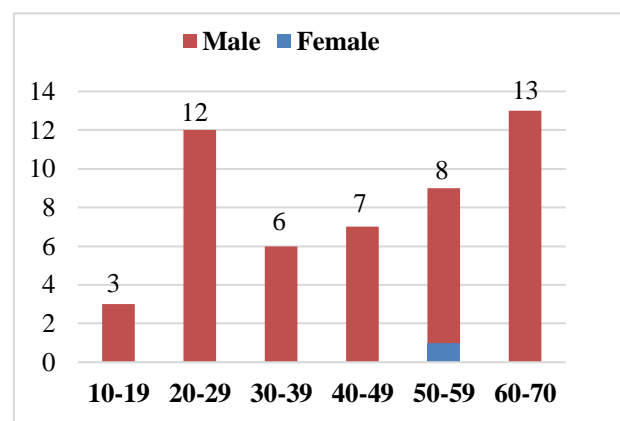


Figure 2: Age and gender wise distribution of cases.

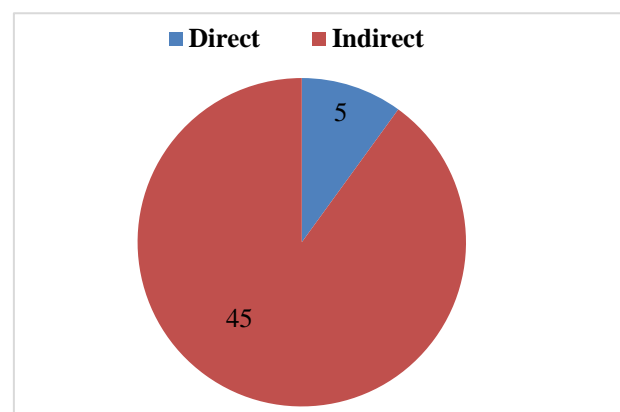


Figure 3: Anatomy wise distribution of hernia.

Gender

Male cases are 98% and female cases were 2% of total 50 cases (Table 2).

Table 2: Distribution of cases and control based on gender.

Sex	Cases		Control		Total	
	N	%	N	%	N	%
Male	49	98	48	96	97	97
Female	1	2	2	4	3	3
Total	50	100	50	100	100	100

Based on BMI

Based on BMI the patient is divided into three class, first class was <18.5, second class between 18.5-24.99 and last class with BMI more than 25 (Table 3).

Table 3: Distribution of cases and controls based on BMI.

BMI	Cases		Controls		Total	
	N	%	N	%	N	%
<18.5	4	8	1	2	5	5
>18.5 to <24.99	46	92	49	98	95	95
>25	0	0	0	0	0	0
Total	50	100	50	100	100	100

Based on anatomy of hernia

Based on the anatomy, which was confirmed intraoperatively, the hernia is divided into indirect, direct and pantaloon type with both components. Of these 50 hernias, 45 (90%) are indirect, 5 (10%) are direct and none are pantaloon type (Figure 3).

Based on site of hernia

Based on site out of 50, 30 (60%) are right sided, 16 (32%) are left sided and 4 (8%) are bilateral hernia (Figure 4).

Based on age, height, weight and other variables

Following table shows variation of age, height, weight, BMI, SS/ST, height/ST,

Weight/ST among cases and control (Table 4).

Height, weight, BMI, height/ST, weight/ST p value was 0.0001 suggestive significant correlation. Although age p value was 0.46 and SS/ST p value was 0.259 which is above 0.05 suggestive of non-significant correlation.

The average of control group ST line 7.01 cm taken as the average cut off of ST value. In the present study, 98%

of cases belonged to the Group II whereas 66% of controls belonged to Group I (Table 5).

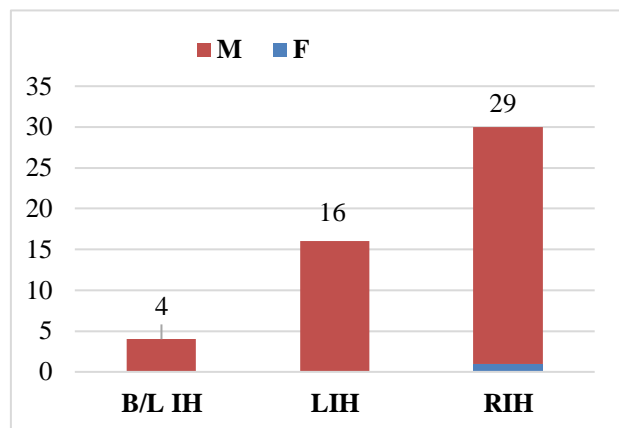


Figure 4: Site of hernia.

Table 4: Distribution of cases and controls based on Age, Height, Weight and other variables.

Variables	Group	N	Mean	Std Dev	P value
Age (years)	Case	50	43.16	17.332	0.46
	Control	50	40.94	12.140	
Height (cm)	Case	50	165.2	6.446	0.0001*
	Control	50	170	5.250	
Weight (kg)	Case	50	56.12	5.546	0.0001*
	Control	50	63.1	5.467	
BMI (kg/m ²)	Case	50	20.551	1.537	0.0001*
	Control	50	21.813	1.402	
SS/ST	Case	50	3.139	0.080	0.259
	Control	50	3.263	0.125	
Height/ST	Case	50	22.435	0.933	0.0001*
	Control	50	24.281	1.112	
Weight/ST	Case	50	7.724	0.781	0.0001*
	Control	50	9.014	0.859	

*Significant

Table 5: Position of pubic tubercle based on ST value in the two groups.

Group	<7.01 cm (Group I)		>7.01 cm (Group II)		Total	
	N	%	N	%	N	%
Cases	1	2	49	98	50	100
Control	33	66	17	34	50	100
Total	34	34	66	66	100	100

DISCUSSION

The causation of inguinal hernia is varied with evolutionary, congenital, environmental, genetic factors, job and also the general state of health all contributing to its development. The low-lying pubic tubercle predisposes to the development of inguinal hernia.

Africans have a higher incidence of inguinal hernia as compared to Europeans since the Africans has comparatively more oblique pelvis (low lying pubic tubercle) than the Europeans.⁶

Sehgal et al in their study have classified the subjects as (Group I) high lying pubic tubercle i.e. those with ST line less than or equal to 7.5 cm and (Group II) low lying pubic tubercle i.e. those with ST line more than 7.5 cm. They found out that in 73.6 % of cases and only 16% of controls belonged to Group II and concluded that the low-lying pubic tubercle was a predisposing factor for inguinal hernia.⁷ Thaer M Farhan in his study found that 74% of cases belonged to the Group II (low lying pubic tubercle) whereas 91.5% of controls belonged to Group I (high lying pubic tubercle). The mean value of ST line in their study group is 7.8115 ± 0.82526 which is significantly greater ($p=0.001$) than the controls the mean value being 6.5440 ± 0.80056 .⁸

The mean value of ST line in our study group is 7.37 ± 0.182 which is significantly greater ($p=0.0001$) than the controls the mean value being 7.01 ± 0.262 . The average ST line of healthy control group (7.01 cm) is taken as the average cut off ST line. In the present study 98% of cases belonged to the Group II whereas 66% of controls belonged to Group I.

The shutter-like mechanism at the internal inguinal ring is provided by contraction of the arching fibres of the internal oblique muscle, which, when shortened, approximate themselves to the inguinal ligament and compress the spermatic cord. The unusual origin and insertion of internal oblique and transverses abdominis muscle, results in an ineffective shutter mechanism of the inguinal canal.

CONCLUSION

Based on my study, interspinal distance (SS line) and pubo-spinal distance (ST line) are more in cases compared to control. So, I conclude that lowness of pubic tubercle is associated with narrow origin of internal oblique muscle from the inguinal ligament which results in an ineffective shutter mechanism of the inguinal canal and consequently inguinal hernia occurs., especially in the presence of other risk factors.

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