

## The Role of Low-Lying Pubic Tubercle in the Development of Inguinal Hernia – A Control Study

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### Abstract

**Objective:** The aim of this study was to find out the relationship of pubo-spinal distance between the cases and controls, to study the clinical profile of inguinal hernia, to study the prevalence of hernia in various age groups and to study the frequency of complication among the patients.

**Design:** This was a case-control study.

**Duration:** 15 Months i.e. from January 2015 to February 2016.

**Setting:** This study was conducted at Raja Muthaih Medical College and hospital.

**Participants:** 150 patients with Inguinal Hernia irrespective of sex and occupation attending the Out Patient and In patient of Raja Muthaih Medical College and Hospital were included in the study

**Methods:** The study was conducted in two groups, the case group – patients suffering from inguinal hernia and the control group – patients attending OPD with other complaints. The inter-spinal distance, the tubo-spinal distance and the mid-inguinal point to pubic tubercle distance were measured. All these measurements thus obtained were tabulated and analyzed using chi-square test and student 't' test.

**Results:** The average SS value for case was 23.12 which was much above the average in control group which was 22.87. The t value was also significant (9.786). For the ST value the mean was 7.34 in the study group and was only 6.93 in the control group. The statistical significance was proved with t value 8.57. The average MP distance was 5.63 in control group which was much higher than study group with distance of 5.327.

**Conclusion:** We can conclude that the anatomy of pubic tubercle and abnormal protective mechanism of internal oblique attribute to the etiology of inguinal hernia.

**Keywords:** Hernia, Inguinal, low lying pubic tubercle

### Introduction

Hernia is the abnormal protrusion of a part or whole of the viscus through a normal or abnormal opening in the cavity that contains it<sup>1</sup>. The inguinal hernia based on anatomical characteristic divided into two types. The most common type is indirect inguinal hernia, in which hernia sac emerge lateral to inferior epigastric artery<sup>2</sup>. It occurs due to the persistence of processus vaginalis. Direct inguinal hernia occurs medial to the inferior epigastric vessels when abdominal contents protrudes along a weak spot in the fascia transversalis which forms the posterior wall of the inguinal canal. Inguinal canal is 3.75cm in length<sup>3</sup> extends from deep to superficial inguinal ring. There are various defensive mechanisms of the inguinal canal to prevent the formation of hernia which are based on anatomical factors. Anatomic variations of different structures facilitating herniation have been assessed. The origin of the internal oblique muscle from the inguinal ligament far away from the pubic tubercle and its lower fibers not covering the internal ring has been implicated in the indirect inguinal hernia<sup>4</sup>. The various degree of incompleteness of the internal oblique muscle in the inguinal region lead to the essential predisposition to direct inguinal hernia. Other factors are an increase in the size of Hessel's triangle<sup>5</sup>. One important factor that determines the probability of an individual to suffer from an inguinal hernia is the location of the pubic tubercle<sup>6</sup>. Even though inguinal hernia is the most common type of hernia, the other types are femoral hernia, diaphragmatic hernia, hiatus hernia, umbilical, epigastric hernia, para umbilical hernia and incisional hernia.

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The rare varieties are spigelian hernia, parastomal, traumatic and lumbar hernia.

## Materials and Methods

**Place of Study:** This study was conducted at Raja Muthaih Medical College and Hospital

**Type Of Study:** This was a case-control study.

**Sample Collection:** Sample Size : 150 Patients.

**Sampling Methods:** Consecutive Sampling.

**Inclusion Criteria:** patients with Inguinal Hernia irrespective of sex and occupation were included in the study.

**Exclusion Criteria:**

1. Patients with obvious risk factors like obstructive uropathy, intra-abdominal malignancies.
2. Patients with age less than 16 years as exact position of pubic tubercle cannot be forecasted due to growth of skeletal system.
3. Patients with congenital and acquired pelvic anomalies.

**Statistical Analysis:** The data collected was entered into Microsoft Excel 2007. The quantitative variables were summarized as mean and standard deviation while qualitative variables as percentage and proportion. To the statistical significance between the two independent groups, Student's t test while in more than two groups, ANNOVA (one way) was applied and to show correlation, Pearson's correlation was applied. The difference was considered significant when p value was less than 0.05. The statistical package used was SPSS 17.

**Ethical Approval:** Approval was taken from the Institutional Ethics Committee prior to commencement of the study.

## Observations and Results

The study was conducted at MGM General Hospital which is attached to KAPV Government medical college Tiruchirapalli. Total 150 patients who are admitted at my hospital are chosen based on prefixed criteria. The controls are selected from the outpatient department which matches with patient with regard to age , sex and BMI.

### AGE

The patient with age more than 16 years is chosen. The lowest age was 17 years and highest age was 83 years. The distribution of cases is shown in the table below, the highest incidence was noted in 50-60 age group with 28%. The lowest incidence 20-30 age group with 5.3% .

### GENDER

The male show dominance among patient with incidence of 130 among 150, female form minority with rest 20 Patients.

Sex	Study		Statistical inference
	n	%	
Male	130	86.7%	X <sup>2</sup> = .000 df = 1 1.000 > 0.05 Not significant
Female	20	13.3%	
Total	150	100%	

Table 1 : Distribution based on gender

### 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 150 hernias 19 hernia are bilateral , of bilateral type 12 has both component as direct and 7 both component indirect. In rest 40 patients have direct hernia and 86 have indirect hemia.5 patients had pantaloon type.

### Based on clinical presentation

The most common clinical presentation is painless swelling in the inguinal region which forms main complaint in 89 patients; pain is the second prominent complaint which forms 37 out of 150 patients. In rest 24 patients pain and swelling both were presenting complaint.

### Based on complication

Complications which I came across in my study were recurrence, obstruction, irreducibility and strangulation. Irreducibility was present in 27 patients, of these 27 patients 14 patient had features of obstruction like vomiting,

constipation and abdominal distention. The features of strangulation present in 4 patients with severe pain, tenderness and redness in the skin over inguinal region. Recurrence was found in only 3 patients.

#### **Duration of disease**

Of the 150 patients, 73 patients presented within one year, 37 patients between one and two year. 28 patient between 2nd and 3rd year . In rest the symptoms are present for more than 3 years.

#### **Associated systemic disease**

Most common systemic disease which was present in my patient was hypertension in 32 patients, followed by diabetic in 21 patients. Both diabetic and hypertension were present in 7 patients. The other diseases like cad, cva, ckdtc were present in 9 patients The patients with other chronic diseases like connective tissue disorder, copd, asthmatics, bph were excluded from the study.

#### **Based On Parity**

Of the 18 females included in our study all of them were parous women.

#### **Based On The Site Of Lesion**

Of the 150 patients 99 patient pathology was on right side and on 32 patients the hernia was on left side. In rest that is on 19 patients the lesion was bilateral.

#### **Based on BMI**

Based on BMI the patient is divided into three class, first class is  $<18.5$ , second class between  $18.5-24.99$  and last class with BMI more than  $25$ . The results I have shown in the graph below. In my study there was 150 cases and 150 controls. Among them the average SS value for case was  $23.12$  which was much above the average in control group which was  $22.87$ . The t value was also significant ( $9.786$ ). When it come to ST value the mean was  $7.34$  in the study group and mean was only  $6.93$  in the control group. The statistical significance was proved with t value  $8.57$ . The average MP distance was  $5.63$  in which was much higher than study group with distance of control group  $5.327$ .

#### **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. Sehgal et al (2000) 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 . The change in posture from pronograde to upright has caused reduction in efficiency of shutter mechanism of inguinal canal leading to the development of inguinal. In the present study  $74\%$  of cases belonged to the Group II whereas  $91.5\%$  of controls belonged to Group I [Table 3]. The mean value of ST line in our study group is  $7.8115+0.82526$  which is significantly greater ( $P=0.001$ ) than the controls the mean value being  $6.5440+0.80056$ . Lopez- Cano et al (2005) have mentioned that the low pubic arch group showed a significantly longer inguinal ligament and a higher angle made by the superior border of the suprainguinal space and inguinal ligament at its medial insertion. The lower the pubic tubercles anatomically located, the more often morphological variation are found in the external oblique, internal oblique, transversus, cremastic muscles and the fascia transversalis. Similar finding was observed by McVay CB et al (1971) and Novarro et al (1992) that European subjects having inguinal hernia have much low-lying public tubercle as compared to the controls not having inguinal hernia. Feasibility of correlation between the measurements of ST line with weight and height was found out by calculating the values of correlation coefficients. A positive correlation was found between weight and ST line ( $r=0.0975$ ) while ( $r=0.0384$ ) between height and ST line.

Similar finding has been revealed by a case control study by Ledinsky et al (1998), Ajmani ML et al (1983) and others. The shutter-like mechanism at the internal inguinal ring is provided by contraction of the arching fibers 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 . This low-lying pubic tubercle is very important before Selecting the Patient for any surgical correction.

It believes that higher the distance between the inguinal ligament and musculoaponeurotic arch the classical inguinal hernia will not be feasible such patient should be chosen for hernioplasty. So, the proper demonstration of anatomy of inguinal region is very important before selecting the surgical technique.

### Conclusions

Based on my Study I have made following conclusions

- The inguinal hernia was more common in 50-60 age group.
- The males are commonly affected than females.
- The right-side inguinal hernia is predominant over left side.
- The indirect type predominates over direct type
- The most common complication seen is irreducibility.
- The most common systemic disease associated is hypertension.
- The most of my patient had BMI 18.5-24.99.
- The most common clinical presentation was swelling.
- Most patients present within 1 year of disease onset.
- SS line, ST line were higher in cases.
- MP line was higher among the controls.

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