

Original Research Article

# A study of role of low lying pubic tubercle in the development of inguinal hernia

C. Arun Babu<sup>1</sup>, Somanatha Sharma<sup>2</sup>, Gnana Sezhian<sup>3\*</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Senior Resident, <sup>3</sup>Post Graduate MS General Surgery  
Department of General Surgery, Stanley Medical College, Chennai, Tamil Nadu, India

\*Corresponding author email: [gnana.mmc@gmail.com](mailto:gnana.mmc@gmail.com)

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## Abstract

**Context:** Hernia is defined as an abnormal protrusion of viscus through normal openings in the body. 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. The structural anatomy is altered i.e. the obliquity of the inguinal canal gets decreased, arching of conjoint tendon gets narrowed, and the shutter mechanism of internal oblique gets diminished leading on to the ineffective defence mechanism ending up in the development of inguinal hernia.

**Aim:** To find out the prevalence of inguinal hernia in low lying pubic tubercle at our tertiary hospital setup.

**Materials and methods:** The ST and SS Line measurements of the case were compared with those of controls to find out whether there was tendency of having low lying pubic tubercle in case of inguinal hernia. An attempt was also made to observe any correlation between ST segment and height, weight of the patients. 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 two groups student 't' test while in more than two groups ANOVA (one way) was applied and to show correlation Pearson's correlation applied. The difference was considered significant when p value was less than 0.05. The statistical package used was SPSS 23.

**Results:** This study showed that the people with low lying pubic tubercle have a reduction in efficiency of shutter mechanism of inguinal canal leading to the development of inguinal hernia.

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

## Key words

Inguinal hernia, Pubic tubercle, Stanley Medical College, Hernia, Inguinal, Pubic, Incidence, Inguinal defense mechanism, Recurrent inguinal hernia.

## Introduction

Hernia is defined as an abnormal protrusion of viscus through normal openings in the body. Hernia is a quite common problem of today's civilization. It was very commonly known condition in ancient times too as First record of hernia condition was reported in 1500 BC By Greeks [1].

Hippocrates used the Greek hernios for bud or bulge to describe abdominal hernias. Statues of the era portray this condition. The Ebers papyrus, from approximately 1550 BCE, detailed the use of a truss [2].

Celsus used transillumination to differentiate a hernia from a hydrocele and advocated gradual pressure (taxis) in the management of incarcerated hernia. The earliest recorded surgical efforts were to reduce the hernia through a scrotal incision, to remove the sac and the testis, and to close the area with sutures that spontaneously extruded.

Success of hernia repair is measured primarily by the permanence of the operation, fewest complications, minimal costs, and earliest return to normal activities. This success depends largely on the surgeon's understanding of the anatomy and physiology of the surgical area as well as knowledge of how to use most effectively the currently available techniques and materials [3].

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.

## Materials and methods

### Source of data

The patients admitted in our hospital wards with symptomatic inguinal hernia without any complications.

### Sample size

A total of 50 patients of Inguinal Hernia who get admitted in surgery and 50 healthy volunteers included in the study. Study group (A): Patients with Inguinal Hernia Control group (B): Healthy volunteers without Inguinal Hernia.

### Selection of patients

In-patients with Inguinal Hernia and same number of matched volunteers not having inguinal hernia taken as control in the Dept. of General Surgery, Stanley GH.

**Sampling method:** Purposive.

### Inclusion criteria

- Any case of uncomplicated inguinal hernia irrespective of sex and occupation.

### 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 of age.
- History of Pelvic fracture/ Anomaly/ Hip Surgery.

### Study procedure

- Method of sampling was non-random, purposive.

- Ethical clearance was obtained from the institute ethical committee
- Written informed consent was obtained from all patients before subjecting them for the study

All patients diagnosed with inguinal hernia were counselled in private about surgery and its related complications. All patients diagnosed with inguinal hernia irrespective of unilateral or bilateral presentation were subjected to anthropological and anatomical analysis for the study and volunteers of same age was also be subjected for anatomical analysis for the study. The following measurement was taken and observations will be recorded and tabulated and analyzed to achieve the objective.

### Measurement

The study subjects were asked to lie in supine relaxed position on hard bed. Keeping both their lower limbs straight, so that both the anterior superior iliac spine were at the same level.

A line was drawn on the anterior abdominal wall. Connecting both anterior superior iliac spine which was given the name **SS Line** and the length of SS Line is noted; next the pubic tubercle on the side of hernia was marked by the palpation. Then vertical distance between this point and the SS Line was measured in centimeters. This line was designated as **ST line**. Similar measurement was done on controls as well.

### Data Analysis

- An attempt was made to find any relationship between ST Line and SS Line measurement and height, weight, built, occupation and age with side of hernia of the patient.
- The ST and SS Line measurements of the case are compared with those of controls to find out whether there was tendency of having low lying pubic tubercle in case of inguinal hernia.

- An attempt was also made to observe any correlation between ST segment and height, weight of the patients.
- 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 two groups student 't' test while in more than two groups ANOVA (one way) was applied and to show correlation Pearson's correlation applied. The difference was considered significant when p value was less than 0.05. The statistical package used was SPSS 23.

### Results

This prospective and observational study was carried out to determine the role of low lying pubic tubercle in the development of inguinal hernia was studied. Fifty patients fulfilling the inclusion criteria from Surgery Department of Stanley Medical College and Hospital during the period of 1 April 2016 to 31 August 2016 were included. All cases were evaluated clinically.

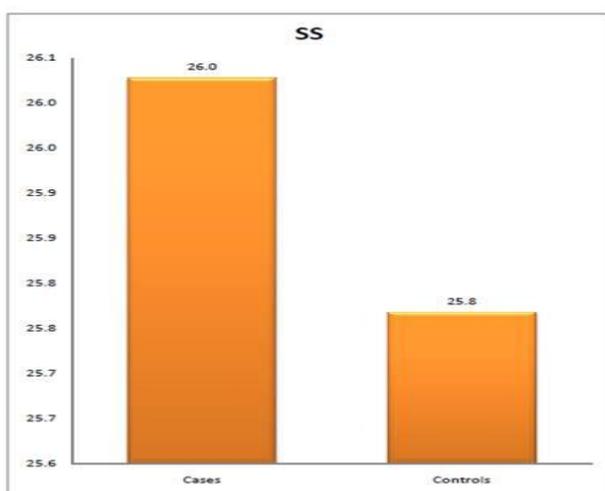
Only essential investigations necessary for diagnosis and preoperative assessment were carried out before operations. All patients underwent conventional hernioplasty. In the limited follow up, no cases of recurrences were noted.

The collected data were analyzed with IBM. SPSS statistics software 23.0 Version. To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean and S.D were used for continuous variables. To find the significant difference between the bivariate samples in Independent groups the Unpaired sample t-test was used. To assess the relationship between the variables Pearson's Correlation was used. In all the above, statistical tools the probability value .05 was considered as significant level (**Table – 1, 2 and Chart – 1, 2**).

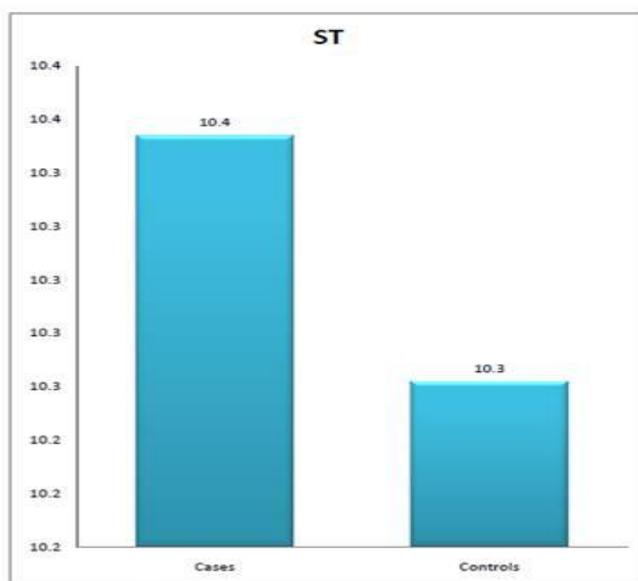
**Table – 1:** SS line and ST line.

Groups	N	Mean	Std. Deviation	Std. Error Mean
SS Cases	50	26.0	.5959	.0843
SS Controls	50	25.8	.9020	.1276
ST Cases	50	10.4	.6893	.0975
ST Controls	50	10.3	.7267	.1028

**Chart – 1:** Case and controls of SS.



**Chart – 2:** Cases and controls of ST.



**Table – 2:** ANOVA test.

ANOVA

ST (CASES)in cm

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	20.321	20	1.016	8.708	.000
Within Groups	3.384	29	.117		
Total	23.705	49			

## Discussion

This prospective, observational and comparative study was conducted among 50 purposively selected patients with evidence of inguinal hernia in department of General Surgery, Stanley Medical College and Hospital. Inguinal hernia is much more common in men as compared to women. 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. One study showed that the low pubic arch group showed a significantly longer inguinal ligament and a greater angle made by the superior border of the suprainguinal space and inguinal ligament at its medial insertion [3].

The lower the pubic tubercles are located, the more often morphological alterations are found in the external oblique, internal oblique, transversus, cremastic muscles and the fascia transversalis. 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. The low pubic tubercle group showed a significantly longer inguinal ligament than the high pubic tubercle group. The greater

length of inguinal ligament and a larger suprainguinal angle may account for a greater area of suprainguinal space which may account for a deficient function of the shutter mechanism.

Harris and White associated a greater length of inguinal ligament with a higher tendency to develop inguinal hernia. One study showed that in the inguinal hernia patients, the origin of internal oblique from the inguinal ligament was away from the pubic tubercle and its lower fibers did not cover the deep inguinal ring leaving it unprotected, allowing the hernial sac to push out when the intra-abdominal pressure is raised. addition to above mentioned pathophysiological factors, the inguinal canal in that study group with low lying pubic tubercle being more longer and more oblique so the hernia sac will push out easier through the canal as the more gravitational effect than when the canal is more or less horizontal or oblique in normal group [4].

So we can state that the functional significance of the inguinal region is modified by bony, ligament and muscular variations and therefore the identification of the structural characteristics enables the surgeon to perform the surgical technique appropriately, be it classical hernia repair or laparoscopic approach for prosthetic mesh implantation [5].

This anthropometric study of pelvis will enable the surgeons to categorize people with low lying pubic tubercle as liable for hernia development

so they should be precautious in doing their daily activities.

On the other hand those patients with low lying pubic tubercle developed inguinal hernia preferably to make hernioraphy for the posterior wall and do reinforcement for the deep ring by mesh for example since they have unprotected deep ring and weak shutter mechanism [6].

The identification of structural characteristics of the inguinal region therefore enable the selecting of the most inguinal operation procedure, hernioplasty. In patients with low-lying pubic tubercle, the gap between inguinal ligament and the lower border of musculo-aponeurotic arch is greater [7].

In low constituted inguinal region there may be high arched myoaponeurotic upper border with wide gap between conjoint tendon and the inguinal ligament or pectineal ligament which creates tension, tissue necrosis with separation of sutured tissue and repeated recurrence of hernia in conventional repair (Abrahamsons). All patients in our study underwent conventional hernioplasty and no recurrence noted in the follow up till date.

### **Conclusion**

This prospective, observational and comparative study was conducted among 50 patients with inguinal hernia in department of General Surgery, Stanley Medical College and Hospital from 1 April 2016 to 31 August 2016. Inguinal hernia is much more common in men as compared to women. In this study, no female case of inguinal hernia was seen. My study observed 56% cases having right sided inguinal hernia. Usually right sided inguinal hernias are commoner because of deferred descent of right testis. In my study, most affected are the patients in their 5<sup>th</sup> decade of life (n =18). In the present study, mean ST Segment in Controls was 10.262 cm and mean ST Segment in Cases was 10.354 cm and it was observed that 62 % (n=31) of cases (patients) in the study group had ST line

measurements more than 10.2 cm (Average length in 50 healthy volunteer controls taken as cut-off limit) indicating that larger the distance more affliction for developing inguinal hernia and only 20% (n=25) of subjects in control group had ST line measurements more than 10.2 cm. This analysis indicates significant correlation between the low lying pubic tubercle and the development of inguinal hernia in the affected individual. This study clearly showed that the group of people with low lying pubic tubercle are at high risk of developing inguinal hernia. All patients underwent open inguinal hernioplasty and in the limited follow up of the patients, no recurrence was noted. It could be concluded that low lying pubic tubercle can be associated with less obliquity of inguinal canal and narrow arching of conjoint tendon with wide origin of internal oblique muscle and Transverse abdominis muscle and hence resulting in an ineffective shutter mechanism of inguinal canal leading to increased risk of development of inguinal hernia.

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