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A Study on Surface Anatomy of Saphenous Opening among Tamilnadu Population

Dr. Sivarajan N.[1], Dr. Janani A. V. K.[2], Dr. Subathira[3], Dr. Senthilnathan[4], Dr. Ajay Lucas[5], Dr. Parthiban[6]

[1]MBBS, DLO, D. Lap, FALS, FIAGES, MS (General Surgery)

[2]MBBS

[3]MBBS, D MRD

[4]MBBS, MD (RD)

[5]MBBS, MD (RD)

Abstract: ***The Saphenous Opening is an important landmark in the groin region, being a defect in the fascia lata through which many superficial structures enter the deeper plane. The Greater Saphenous vein terminates to the femoral vein through this opening. There are five tributaries that joins the GSV before the GSV joins the Femoral Vein namely the superficial epigastric vein, the circumflex iliac vein, the superficial external pudendal vein, the deep external pudendal vein and the anterior accessory GSV.***

Keywords: Saphenous opening, Pubic tubercle, Saphenofemoral junction

1. Introduction

Importance of saphenous Opening

The split fascia lata -The superficial and deep stratum has three modifications. One of them is the saphenous opening, which is an oval aperture. The Saphenous opening is assessed to reach the saphenous vein in coronary artery bypass graft (CABG). It is also a preferred conduit for vascular surgeons for peripheral bypass operations. It is the landmark for flush ligation of Greater saphenous vein in SFJ incompetence in varicose veins surgery.

The Surface Anatomy of the saphenous opening is measured from the Pubic tubercle as the bony landmark. Various anatomical and surgical textbooks gives varying dimensions of surface anatomy of the saphenous opening, this prompted the current study as to find the average distance of saphenous opening from the pubic tubercle in our South Indian population.

2. Literature Review

Bailey and Love 28th edition, the surface marking of Saphenous opening is approximately 2.5 cms below and lateral to pubic tubercle [1]. Gray's Anatomy for students gives saphenous opening as just inferior to medial end of inguinal ligament without any dimension [2],Grant's dissector gives saphenous opening as 4cms below inguinal ligament [3], Cunningham's manual of practical Anatomy-16th edition states saphenous opening at 3-4 cms from the pubic tubercle [4], Schwartz Principles of Surgery 11th edition gives saphenous opening 4cms inferior and lateral to pubic tubercle [5], SRB manual of Surgery 6th edition states Saphenous opening as 3.75 cms below and lateral to pubic tubercle [6],Vishram Singh Textbook of surgery 3rd edition states saphenous opening as 4cms below and lateral to pubic tubercle [7]. With varying reference with standard textbooks for a single important landmark prompted us to do a study on the exact site of saphenous opening among our South Indian population.

3. Methodology

The initial assessment of the surface Anatomy was done by using Ultrasound imaging study conducted at erode at a recognized Sonography centre, followed by CT Scan study conducted at a tertiary care center chennai and the results obtained there is compared and the final surface anatomy of Saphenous Opening is established among population of Tamilnadu with respect to various Age, sex, side(right/left).Saphenous opening of our South Indian population established after applying the appropriate statistical tools.

A) Ultrasound Protocol for measuring the distance between pubic tubercle and saphenous opening.

Patient Positioning:
Supine
Scanning Technique:
1.Machine Model: Philips HD 11 XE
Linear Probe 12L
10 to 12 MHz frequency used

Measurement Technique: After identifying pubic tubercle clinically, identification of SFJ is done and marked in the skin. The distance between the pubic tubercle and the SF junction is measured and noted in both sides of the patient, the most common approach is to measure in a straight line using the scale from the anterior aspect of the pubic tubercle to the saphenofemoral Junction (SFJ).

Saphenous opening is noted and the average mean with respect to age and sex from distance calculated by using appropriate statistical tools.

A) **The CT protocol for measuring the distance between the pubic tubercle and saphenofemoral junction involves several key steps and considerations:**

Patient Positioning:
The patient should be positioned supine on the CT scanner table, with the lower limbs fully extended and the arms comfortably placed by their sides.

Scanning Parameters:
The CT scan should be performed using a multidetector CT scanner with high-resolution capabilities. The scan parameters typically include:

Slice thickness:
Thin slices (e.g., 1-3 mm) to ensure detailed visualization of anatomical structures.
Reconstruction interval: Minimal reconstruction interval to reduce the risk of missing important landmarks.

Tube voltage:
Typically, between 100-120 kVp, depending on patient size and scanner specifications.

Tube current:
Adjusted based on patient size and scanner specifications to optimize image quality while minimizing radiation dose.

Contrast Administration:
Depending on the specific objectives of the study, contrast administration may or may not be necessary. If contrast is used, a non-ionic iodinated contrast agent is typically administered intravenously to enhance vascular structures and improve visualization of the saphenofemoral junction.

Scan Coverage:
The CT scan should include the entire pelvis and proximal thigh region to ensure adequate coverage of the pubic tubercle and saphenofemoral junction. This may require scanning from the level of the iliac crest down to the mid-thigh or beyond.

Image Reconstruction:
After acquiring the raw CT data, image reconstruction is performed to generate cross-sectional images in the axial, sagittal, and coronal planes. Multiplanar reformations (MPR) can be particularly useful for accurately measuring distances between anatomical landmarks, such as the pubic tubercle and saphenofemoral junction.

Measurement Technique:
The distance between the pubic tubercle and saphenofemoral junction is typically measured on axial or coronal images using electronic calipers or measurement tools available on the CT workstation. The most common approach is to measure in a straight line from the anterior aspect of the pubic tubercle to the saphenofemoral junction.

Figure 1: Right coronal view

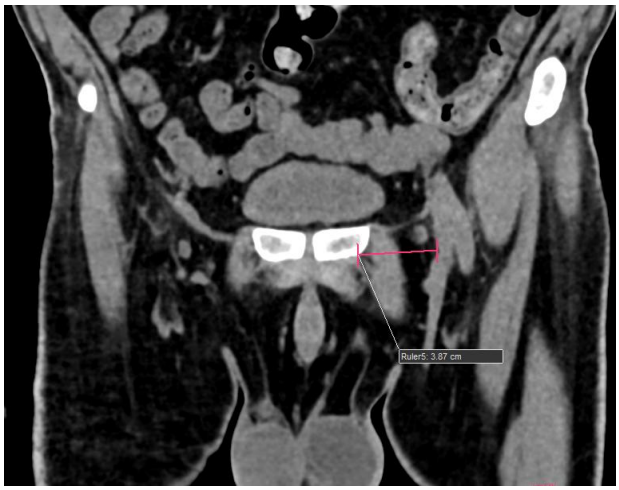

Figure 2: Left coronal view

Figure 3: Right SFJ opening

Figure 4: Left SFJ opening

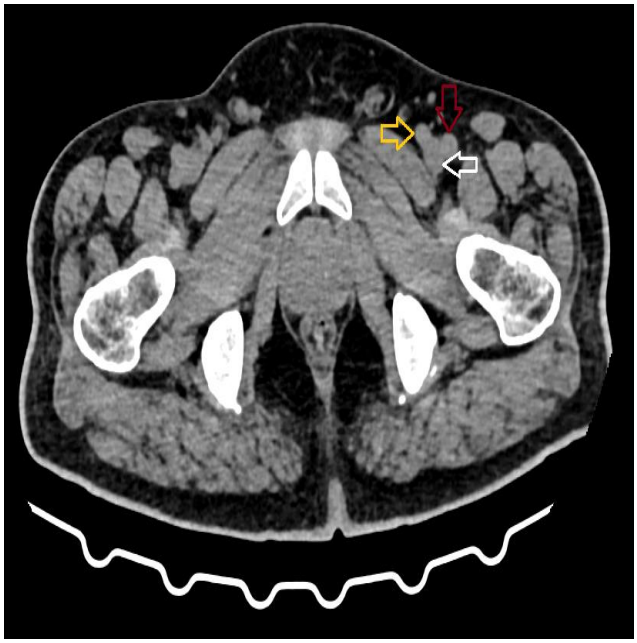

Figure 5: Yellow (Saphenous), Brown (Femoral artery), White (Femoral vein)

Statistical Analysis:
SPSS 16.0 version is used for statistical analysis. Independent t test, paired t test and diagrams are used. The p value <0.05 is considered statistically significant.

Table 1: Comparison between USG and CT among sides

Side	Group	N	Mean ± S.D	p value
Right Side	Group 1	150	3.05±0.4	0.000*
	Group 2	134	3.26±0.5	
Left Side	Group 1	150	3.03±0.3	0.000*
	Group 2	134	3.22±0.4	

Table 2: Mean comparison between USG and CT among male

Side	Group 1	Mean ± S.D	p value
RIGHT SIDE	CT	3.02±0.3	0.000*
	USG	3.31±0.5	
LEFT SIDE	CT	2.99±0.3	0.000*
	USG	3.28±0.4	

Table 3: Mean comparison between USG and CT among female

Side	Group	Mean ± S.D	p value
RIGHT SIDE	CT	3.07±0.4	0.103
	USG	3.20±0.5	
LEFT SIDE	CT	3.06±0.4	0.256
	USG	3.14±0.5	

USG

Figure 1: Age wise distribution

Table 4: Mean comparison between sex among sides

Side	Sex	Mean±S.D	p value
Right Side	Male	3.02±0.3	0.319
	Female	3.07±0.4	
Left Side	Male	2.99±0.3	0.249
	Female	3.06±0.4	

Table 5: Pairwise comparison between sides

Side	Mean ± S.D	p value
Right Side	3.04±0.4	0.000*
Left Side	3.03±0.3	

Table 6: Mean comparison between age among side

Side	Age	Mean ± S.D	p value
Right side	<20	2.56±0.5	0.000*
	21-30	2.92±0.5	
	31-40	3.09±0.4	
	41-50	3.19±0.2	
	51-60	3.12±0.2	
	61-70	3.05±0.3	
	>70	2.91±0.3	
Left side	<20	2.52±0.5	0.000*
	21-30	2.89±0.5	
	31-40	3.09±0.4	
	41-50	3.15±0.2	
	51-60	3.11±0.2	
	61-70	3.03±0.2	
	>70	2.90±0.3	

CT sample size 134

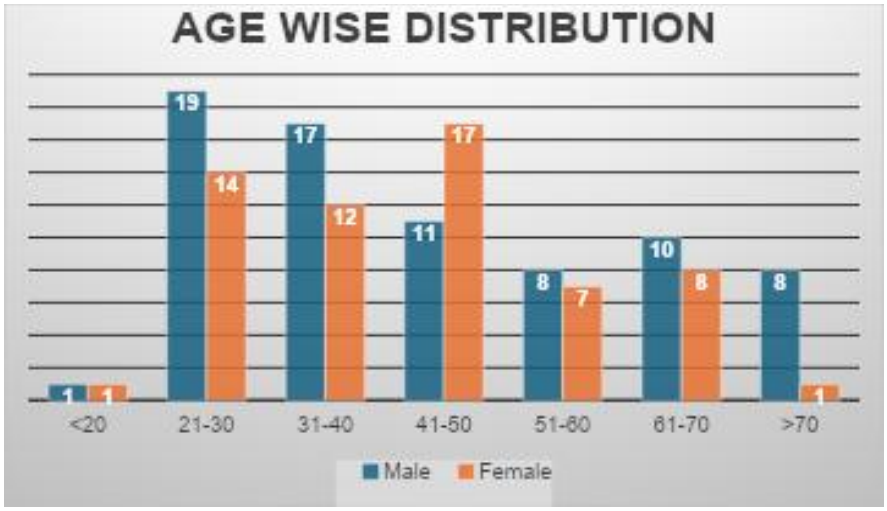

Figure 2: Age wise distribution

Table 7: Mean comparison between sex and side

Variables	Male	Female	p value
d1	3.31±0.5	3.20±0.5	0.165
d2	3.28±0.4	3.14±0.5	0.062

Table 8: Mean comparison between right and left side

Variables	Mean ± S. D	p value
d1	3.26±0.5	0.082
d2	3.22±0.4	

Table 9: Mean comparison

Side	Age	Mean ± S.D	p value
Right	<30	3.24±0.5	0.392
	31-40	3.40±0.4	
	41-50	3.20±0.5	
	51-60	3.33±0.5	
	61-70	3.22±0.4	
	>70	3.05±0.6	
Left	<30	3.23±0.4	0.252
	31-40	3.32±0.4	
	41-50	3.20±0.4	
	51-60	3.30±0.4	
	61-70	3.16±0.4	
	>70	2.92±0.6	

4. Discussion

Convenient sampling method adopted in both procedures with patients who came for sonography of Abdomen and Ct scan of Abdomen for various ailments. The following results obtained, for Ultrasonography study the sample size was around 150, for CT study the sample size was 134, with Male: Female were 63:87 for USG and M: F were 74:60 for CT. The surface marking of Saphenous opening is done by measuring the distance from the pubic tubercle to the saphenous opening which lies inferolateral to the pubic tubercle in centimetres. Mean and range of the population under study is found out using SPSS 16.0 version. Independent t test, paired t test applied. The p value <0.05 is considered statistically significant.

The following is the determined

Results thereof;
The mean distance among our population is 3.04 cms with a range of +/-0.4 cms.

Males being -3.02+/-0.3cm of the Saphenous Opening on The Right lower limb, 2.99 +/-0.3cm of the Saphenous Opening on the left lower limb.

Females being 3.07+/-0.4cm of the Saphenous Opening on the Right Lower limb,3.06+/-0.4cm of the Saphenous opening on the left lower limb.

5. Conclusion

The final dimension of Surface marking of Saphenous Opening which is the distance measured inferolateral from Pubic tubercle to fossa ovalis in the thigh among our South Indian Population is 3.04 cms with a range of plus 0.4 cms to minus 0.4 cms and it is statistically significant.

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