Research Paper

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Study of The Surgical Anatomy of the Sapheno- Femoral Junction

Medical Science

KEYWORDS :

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INTRODUCTION:

Varicose veins is a frequently encountered surgical problem in today's practice. Ligation of the Sapheno-Femoral junction (SFJ) in Flush with the femoral vein after ligating and dividing the known and unknown tributaries (Trendelenburg's procedure) is a time tested method of treating Sapheno-Femoral incompetence in primary varicose veins.

- The junction is identified by a commonly used surface marking which is 4cm lateral and inferior to the pubic tubercle. An incision made at this point however, fails to accurately reach the position of the SFJ frequently, there by more chance of injury to femoral vessels and failure in flush ligation accurately results in recurrence.
- It has been shown that a 2cm oblique incision made just lateral to pubic tubercle and 1cm above the groin crease - reveals the SFJ with minimal dissection and SFJ can be reached more precisely. Thereby improving the surgical outcome and limiting the size of the incision with better cosmesis.

There is however insufficient evidence to show that SFJ is indeed at the level of pubic tubercle. Therefore there was a need to evaluate the level of the SFJ with respect to pubic tubercle (at that level) by using this new incision.

OBJECTIVES OF THE STUDY

PRIMARY

- To establish sapheno femoral junction is lateral to and at the level of pubic tubercle.

SECONDARY

- To document if any anatomical subtypes of the sapheno femoral junction.
- To evaluate post operative wound infection, dehiscence and to establish better cosmetic outcome.
- To evaluate the accuracy of Venous Doppler Imaging in locating the SFJ pre operatively.

MATERIALS AND METHODS

Source of Data

All patients admitted to JSS Hospital with clinically diagnosed and sonologically proved primary varicose veins with SFJ incompetence within the study period.

Sample Size

Minimum of 50 Cases of Primary varicose veins of the Great Saphenous System with SFJ incompetence.

(Assumptions were alpha 0.05, beta 0.2, power 80%, margin of error 5%, confidence level 95 %.)

Inclusion Criteria

- All patients with clinically diagnosed and sonologically proved primary varicose veins of the Great Saphenous system with SFJ incompetence.

Exclusion Criteria

- Age less than 12 years
- Pregnant women
- Secondary varicose veins
- Klippel - Trenaunay syndrome

Study Design

A prospective exploratory Study.

Method of collection of data

- All patients admitted with clinically and sonologically proved primary varicose veins of the GSV system are included in the study
- Patient height, weight, BMI measured.
- The SFJ is marked preoperatively by Venous Doppler scan.
- Surgery for the SFJ is performed using a new oblique incision 1cm above the groin crease, at the level of the Pubic Tubercle.
- Once the SFJ has been dissected out.

(1) Its level respect to the pubic Tubercle is noted.
(2) The veracity of the Venous Doppler Marking is ascertained,
(3) Any anatomical subtypes of the SFJ are noted.

Statistical methods

Descriptive statistics is done measuring mean, standard deviation and proportions with 95% confidence interval.

Inferential statistics is done by using Analysis of Variance (ANOVA) with post hoc tests (to compare means of more than two independent groups), chi-square test (to compare independent proportions).

Percentage agreement with kappa value is measured while comparing the two methods of measurements like USG method and OT method to identify the SFJ site.

Paired t test is used to compare two methods of identifying SFJ distance from pubic tubercle. P value <0.05 is considered as statistically significant.

All statistical calculations are done using SPSS version 13.0. Graphical presentation was done by using Microsoft Excel.

OBSERVATION AND RESULTS

1. AGE DISTRIBUTION

Age group yrs	Frequency	Percent
<40	15	25.0
41-50	23	38.3
51-60	15	25.0
>61	7	11.7
Total	60	100.0

Table 1.Age Incidence

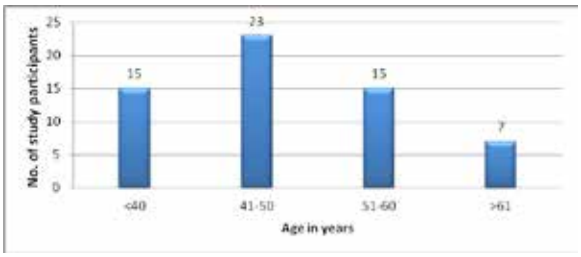

Fig.18. Graphical representation of age incidence

In our study out of 60 patients, maximum incidence of varicose vein is found in age group of 41 to 50 years with 23 patients (38.3%). Second most common incidence seen in age group of 51-60 years with total of 15 patients (25%), and also in age group of 20-40 years, 7 patients (11.7%) were aged more than 60 years.

2. SEX DISTRIBUTION

Gender	Frequency	Percent
Male	56	93.3
Female	4	6.7
Total	60	100.0

Table 2. Sex incidence

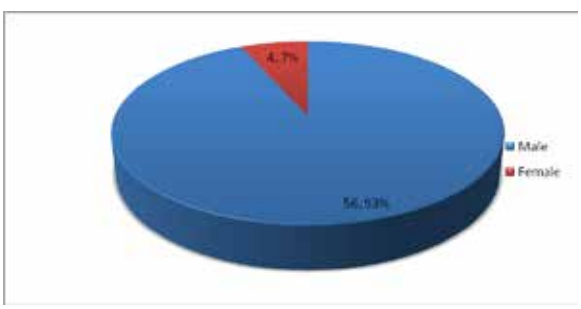

Fig.19. Graphical representation of Sex incidence

In 60 cases, 56 were male patients and 4 were female patients. Incidence of varicose vein was more common among the males with 93.3%.

3. DIAGNOSIS

In our study, 23 patients presented with right side varicose veins and 37 patients with left leg varicosity, thus **left side varicose is more common than right**. 27 patients presented with only SFJ incompetence, 18 patients with SFJ and perforator incompetence, 13 patients with SFJ and SPJ incompetence with or without perforator incompetence, 2 patients presented with SFJ incompetence and associated complications (skin changes/venous ulcer).

DIAGNOSIS	FREQUENCY	PERCENT
L1	14	23.3
L2	9	15.0
L3	12	20.0
L4	2	3.3
R1	13	21.7
R2	9	15.0
R3	1	1.7
R4	0	0
Total	60	100.0

Table 3.Incidence of different mode of presentation

Lateral distance in cm	Frequency	%
3.00	17	28.3
3.50	15	25.0
4.00	23	38.3
4.50	4	6.7
5.00	1	1.7
Total	60	100.0

4.PREOPERATIVE DUPLEX SCAN MARKING OF LATERTAL DISTANCE OF SFJ FROM THE PUBIC TUBERCLE

In most of the patients lateral distance of SFJ from the Pubic tubercle was 4.0 cm (38.3%) with mean distance of 3.64 cm.

Table 4. Lateral distance of SFJ from the pubic tubercle (preoperative duplex scan marking)

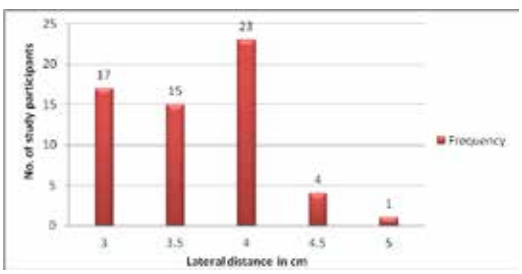

Fig.20.Graphical representation of lateral distance of SFJ from the pubic tubercle (preoperative duplex scan marking)

4. USG FINDING - RELATION OF SFJ TO PUBIC TUBERCLE

Out of 60 patents, SFJ was below the pubic tubercle in 53 patients(88.3%) and in 7 patients(11.7%) it was marked at the level with pubic tubercle.

	Frequency	Percent
Below	53	88.3
At the level	7	11.7
Total	60	100.0

Table 5.Incidence of USG finding of relation of SFJ to Pubic tubercle

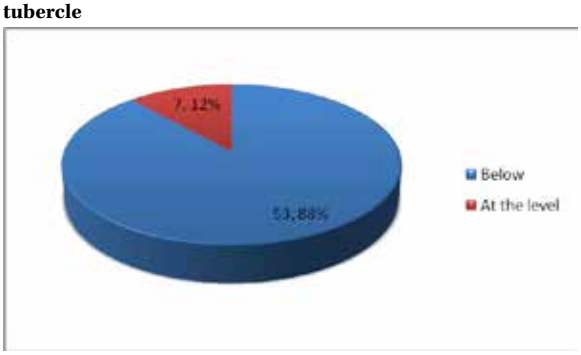

Fig.21.Graphical representation of USG finding of relation of SFJ to Pubic tubercle

5.DUPLEX SCAN MARKING OF VERTICAL DISTANCE OF SFJ FROM THE PUBIC TUBERCLE

Out of 60 cases, in **19(31.7%)** cases the duplex scan marking of vertical distance of SFJ from PT was around **2cm** and in 7 cases **(11.7%)** it was at level of PT, with **mean vertical distance of 1.8583 cm**.

USG in cm	Frequency	Percent
At the level	7	11.7
1.0	15	25.0
1.5	1	1.7
2.00	19	31.7

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3.00	13	21.7
3.50	4	6.7
4.00	1	1.7
Total	60	100.0

Table 6. Duplex scan marking of vertical distance of SFJ from the PT

5. INTRAOPERATIVE FINDING OF LATERAL DISTANCE OF SFJ FROM PT

In our study out of 60 cases, in 22(36.7%) cases lateral distance from SFJ to PT was 3cm and in 19(31.7%) cases was 3.5cm, and 4cm in remaining 19(31.7%) cases.with **mean distance of 3.4750**.

Intraoperative lateral distance (cm)	Frequency	Percent
3.00	22	36.7
3.50	19	31.7
4.00	19	31.7
Total	60	100.0

Table 7. Intraoperative finding of lateral distance of SFJ from PT

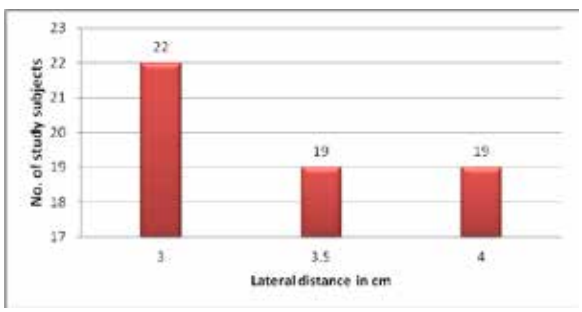


Fig.22. Graphical representation of Intraoperative finding of lateral distance of SFJ from PT

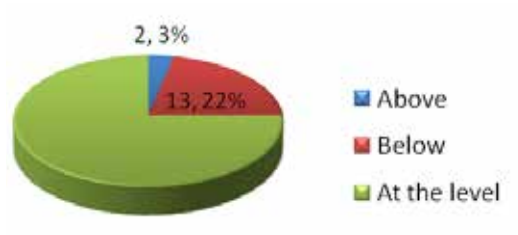
8. INTRAOPERATIVE FINDING OF VERTICAL DISTANCE OF SFJ FROM PUBIC TUBERCLE

Out of 60 cases, in 45(75%) cases SFJ was found at the level of PT, 2 cases it was found above the level of PT, and in 13(21.7%) cases it was below the level of PT, with mean distance of 0.283cm (3mm) below the level of pubic tubercle.

Vertical distance from pubic tubercle on OT	Frequency	Percent
Above	2	3.3
Below	13	21.7
At the level	45	75.0
Total	60	100.0

Vertical distance from pubic tubercle on OT	Frequency	Percent
3 cm Above	1	1.7
2 cm Above	1	1.7
At the level	45	75.0
1 cm Below	6	10.0
2 cm Below	5	8.3
3 cm Below	2	3.3
Total	60	100.0

Table 8. Intra operative table finding of vertical distance of SFJ from PT



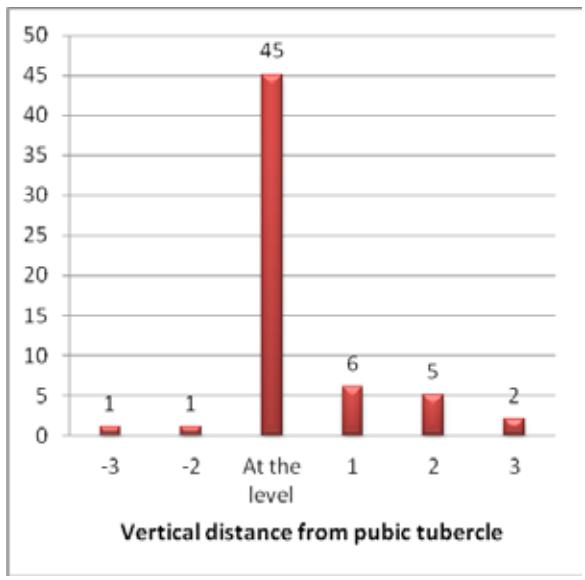


Fig.23.Graphical representation of intraoperative finding of vertical distance of SFJ from PT

9. Agreement between USG and intra op finding in determining vertical location of SFJ

		OT			Total
		Above	Below	Same level	
USG	Above	0	0	0	0
	Below	2	13 (21.6%)	38	53
	Same level	0	0	7(11.7%)	7
Total		2	13	45	60

Kappa=0.07, p=0.12 (poor agreement)

Table 9.Difference in USG and intra op findings of location of SFJ

By comparing intraoperative finding with ultrasound finding shows no correlation which is proven stastically (p value = 0.12) hence the poor agreement between two.

10. CORRELATION OF LATERAL DISTANCES OF SFJ TO PT MEASURED BY USG AND ON TABLE

	N	Mean	SD
USG LAT	60	3.6417	.50499
OT LAT	60	3.4750	.41604

Paired t test, p=0.009 (mean difference is 0.16) Pearson Correlation- 0.48

Table 10. Correlation of lateral distances of SFJ from PT measured by USG and Intraop Finding

Fig.24.Graphical representation of correlation of lateral distances of SFJ from PT measured by USG and Intraop finding

Correlation of lateral distances of SFJ from PT measured by USG and during intraop finding shows mean difference of 0.16cm with significant p=0.009.

11. CORRELATION OF VERTICAL DISTANCES OF SFJ FROM PT MEASURED BY USG AND ON TABLE FINDING

There is a significant mean differences of 1.57cm between two methods with significant **p value <0.0001**. Hence no correlation between two and it shows lesser specificity of USG in SFJ marking.

	N	Mean	SD
USG	60	1.8583	1.07393
OT	60	0.2833	1.09812

Paired t test, p<0.0001 (mean difference is 1.57) Pearson Correlation- 0.31

Table 11.Comparison of mean distance of SFJ from PT

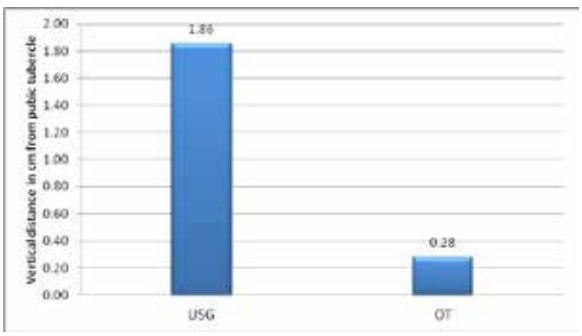


Fig.25.Graphical representation of comparison of mean distance of SFJ from PT.

(Above the tubercle distances are taken as negative values, and below are taken as positive values).

12. NUMBER OF TRIBUTARIES

In our study, 4 tributaries were identified in 23 patients (38.3%), 3 tributaries were found in 17 patients (28.3%), 5 tributaries in 12 patients(20%), maximum number of tributaries identified and ligated was 7 in one patient and minimum 2 tributaries in two patients. **Mean number of tributaries were 4.1.**

No. of Tributaries	Frequency	Percent
2.00	2	3.3
3.00	17	28.3
4.00	23	38.3
5.00	12	20.0
6.00	5	8.3
7.00	1	1.7
Total	60	100.0

Table 12.Number of tributaries ligated at venous confluence

13. ANATOMICAL SUBTYPES OF SFJ

	Frequency	Percent
I	56	93.3
H	3	5.0
S	1	1.7
Total	60	100.0

Table 13.Incidence of anatomical subtypes of SFJ

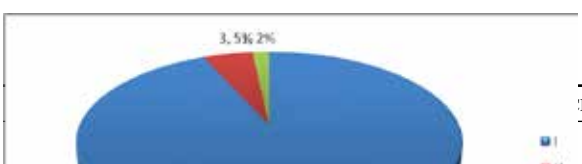


Fig.26. Graphical representation of anatomical subtypes of SFJ

In our study out of 60 patients 56 patients (93.3%) had I type, 3 patients (5%) had H type, and 1 patient (1.7%) had S type of Sapheno Femoral Junction.

14. POST OPERATIVE WOUND

None of our patients developed wound complications. Wound was healthy in all the 60 patients.

15. COSMETIC OUTCOME

In all 60 patients post op cosmetic outcome was good.

16. CORRELATION BETWEEN VERTICAL DISTANCE AND BMI

In our study shows obese are significantly higher level of SFJ than normal and over weight.

	N	Mean (cm)	SD	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
Underweight	8	.2500	.46291	-.1370	.6370	.00	1.00
Normal	31	.4194	.84751	.1085	.7302	.00	3.00
Overweight	14	.5000	.94054	-.0431	1.0431	.00	3.00
Obese	7	-.7143	1.25357	-1.8736	.4451	-3.00	.00
Total	60	.2833	.94046	.0404	.5263	-3.00	3.00

ANOVA , p=0.01

Table 14. Correlation between vertical distance and BMI

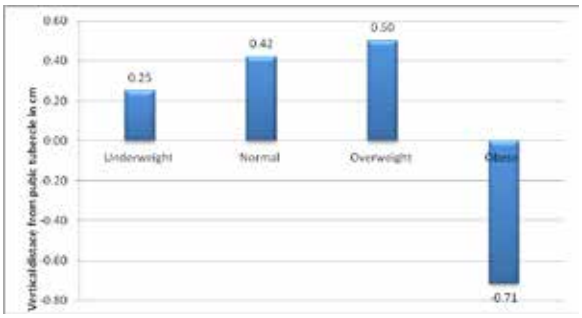


Fig.27.Graphical representation of correlation between vertical distance and BMI

	Above		Below		At the level		
BMI category	No	%	No	%	No	%	TOTAL
Underweight	0	0	2	25	6	75	8
Normal	0	0	7	22.6	24.0	77.4	31
Overweight	0	0	4	28.6	10.0	71.4	14
Obese	2	28.6	0	0.0	5.0	71.4	7
Total	2	3.3	13	21.7	45.0	75.0	60

Table 15.The cross tabulation between vertical distance and BMI

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Fig.28.Graphical representation of cross tabulation between vertical distance and BMI

DISCUSSION

AGE

Brand et al (1988) found in their survey in the USA, that the prevalence of varicose veins among people younger than 30 years was less than 1% for men and less than 10% for women. However, from age 70 years and older, the estimates increased substantially to 57% and 77%, in men and women respectively.[10]

Another study by Hoseein et al they studied 228 patient of varicose vein, the mean age of patients was 45.03 years.

In our study prevalence of varicose veins more among age group of 40-50 years.

Sex

There is no consistency in the literature as to gender differences in prevalence of varicose veins. Several studies have shown that varicose veins appear to be more prevalent in women (Brand, Dannenberg et al. 1988, Callam 1994, Bergan, Schmid-Schonbein et al. 2006).[5] This finding is however not supported by other population based studies, which have shown higher prevalence in men (Evans, Fowkes et al. 1999).[3]

The Edinburgh vein study[3] and a Bulgarian cross sectional survey[6] showed a higher prevalence of telangiectasia in women, but a higher prevalence of trunk varicosities in men. This would indicate that perhaps, it is the presence of telangiectasia as opposed to trunk varices, which makes varicose veins more common in women.

In our study prevalence of varicose vein was more common among the males with 93.3%, which may be due to more male patients getting admitted because of more severe disease. Hence the prevalence of disease in hospital admitted cases is more towards male population. which is against the world literature and it needs to be evaluated further.

DIAGNOSIS

In our study number of cases presented with varicosity of right leg was 23 and left was 37, left side was more common than right. Varicose vein with only SFJ incompetence was 27, varicose vein with SFJ with perforator incompetence was 18, varicose vein with SFJ and SPJ incompetence with or without perforator incompetence was 13, and varicose vein with SFJ incompetence with complications (skin changes /venous ulcer) was 2. Hence many of the patients still come at the progressed state of the disease.

NUMBER OF TRIBUTARIES

Hossein Hemmati et al[119] studied 228 patients with varicose veins over period of 2 years. The number and name of tributaries at the saphenofemoral junction, presence of external pudendal artery and its relationship to the saphenofemoral junction were recorded. The number of tributaries varied from 2 to 7 at the first five centimetres of the great saphenous vein. The mean number of branches was 3.87.

Carolina Vaz et al[120] studied on 140 patients with primary varicose veins, the number of tributaries at the SFJ varied from 1 to 7.

In our study, 4 tributaries were identified in 23 patients (38.3%), 3 tributaries were found in 17 patients (28.3%), 5 tributaries in 12 patients(20%), maximum number of tributaries identified and ligated was 7 in one patient and minimum 2 tributaries in two patients. Mean number of tributaries were 4, correlating well with the above studies.

ANATOMICAL SUBTYPES OF SFJ

Ricci S, Caggiati A et al.[33] researched on echoanatomical patterns of the long saphenous vein in patients with primary varices and in healthy subjects concluded that 57% of limbs in patients with varices, reflux follows the saphenous vein forming I type, while in 43% the reflux is spilled outside the LSV into an ASV leading to formation of H or S types.

In our study out of 60 patients 56 patients (93.3%) had I type, 3 patients (5%) had H type, and 1 patient (1.7%) had S type of sapheno femoral junction. Hence most of our patients had reflux to only along the great saphenous vein rather than along ASV, which may be only the duplex finding as in the earlier study.

BMI

In the study done by Seidell, Bakx et al.[15] as a retrospective cohort in dutch population in 1986 observed that obese women (BMI ≥ 30 Kg/m2) were 3 times more likely to report varicose veins.

In our study varicose vein was more common among the patient with BMI >25 and also shows obese patients have significantly higher level of SFJ than in normal and overweight, hence further study is required to prove the exact site of the junction which would be definitely at the level of PT or even cranially.

LOCATION OF SFJ

In our study USG finding of location of SFJ in 60 cases found that position of SFJ was at mean distance of 3.641cm lateral and 1.853 cm below from the Pubic tubercle, intra operatively it was found that position of SFJ was at mean distance of 3.475 cm lateral and 0.2833 cm below the level of pubic tubercle, thus there is no correlation of the ultrasound and intra operative level of SFJ. There is a mean difference of 1.57cm vertical distance with significant $p<0.0001$. This shows that USG duplex scan for marking is not accurate investigating tool for identifying the exact location of SFJ, it is rather misleading.

Reason for veracity of USG duplex scan may be due to more concentration subcutaneous fat in the groin site and shape of the groin area itself , and direction of USG probe held during marking ,and marking was not done by single radiologist might be subjective variation.

POST OP WOUND COMPLICATIONS AND COSMESIS

Critchely et al.[108] reported the rate of wound infection as 4.0%-4.5%, is within the limits usually cited for clean surgery. In our study post op infection rate was zero and cosmesis in all patients were good.

CONCLUSION

Varicose veins are one of the common disease in our surgical OPD, is more common among male population with increased incidence among 41-50 years. Most common investigation for this disease being USG Duplex, its clarity and accuracy in marking the level of SFJ is doubtful. SFJ is found to be at the level of pubic tubercle in our study, which is a fixed bony landmark. It also helps in reducing the scar size and eases the surgery by reducing the dissection and operating time. It also helps in appropriate flush ligation at the junction and reducing the chances of recurrence. Up to 7 tributaries were found in our study.

In conclusion, incision of 2cm just lateral to pubic tubercle is sufficient for precise SFJ ligation along with accurate tributaries ligation and ensuring appropriate surgical technique and a complete knowledge of the anatomical variations of the SFJ is important in ensuring that the junction is safely managed, less aggressively and with more efficiency in order that high quality surgery will always remain the objective.

SUMMARY

- The maximum incidence of varicose vein is found in age group of 41 to 50 years.
- Incidence of varicose vein was more common among the males with 93.3% compare to world literature, needs further evaluation.
- 23 patients presented with right side varicose veins and 37 patients with left leg varicosity, thus left side varicose is more common than right.
- The Mean number of tributaries identified were 4.1.The total 4 tributaries were identified in 23 patients (38.3%), 3 tributaries were found in 17 patients (28.3%), 5 tributaries in 12 patients(20%), maximum number of tributaries identified and ligated was 7 in one patient and minimum 2 tributaries in two patients.
- The anatomical subtypes of SFJ were 56 patients (93.3%) had I type, 3 patients (5%) had H type, and 1 patient (1.7%) had S type of Sapheno Femoral Junction.
- The location SFJ -In 45(75%) cases SFJ was found at the level of pubic tubercle, 2 cases it was found above the level of pubic tubercle, and in 13(21.7%) cases it was below the level of pubic tubercle, with mean distance of 0.283cm (3mm) below the level of pubic tubercle almost at level of pubic tubercle.
- Varicose vein was more common among the patient with BMI >25.
- Post op infection rate was zero and cosmesis in all patients were good.
- In conclusion, it should be kept in mind that the success rate of the surgical procedure may be relevant to anatomical variation. It is imperative to explore great saphenous vein precisely to identify all saphenofemoral junction tributaries (about four tributaries by average) to ensure appropriate surgical technique To be familiar with the anatomical variations may decrease the recurrence rates of disease.

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