ORIGINAL ARTICLE

Cost effectiveness and hospital stay in percutaneous Gonadal vein embolization technique in comparison with surgical ligation in poor socioeconomic society of Pakistan

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Abstract

Objective: Gonadal Vein Embolization is relatively new technique introduced in Pakistan and mostly being employed at The Aga Khan University Hospital in the Department of Radiology in Pakistan for the treatment of infertility. Purpose of this study is to compare the technique with surgical ligation of varicocele in term of cost effectiveness and hospital stay which is most important issue in poor socioeconomic countries like Pakistan.

Methodology: This is a basically retrospective study. Total patients presented for varicocele treatment were 108 and all patients had clinical varicocele. 48 patients (44%) out of these 108 cases underwent percutaneous embolization by coil primarily and 60 patients (56%) had surgical ligation of Gonadal vein.

Results: Duration of hospital stay for high ligation group was 1-6 days with mean duration of 2.8 days, 1-3 days with mean duration of 1.8 days for laparoscopic group and 2-3 days with mean duration of 2.3 days for inguinal ligation group.

Hospital stay for patients in embolization group was 30 minutes to 2 hours with mean duration of 75 minutes. Total cost of Gonadal vein embolization unilaterally at AKUH is Rupees 35000 (US dollars 432.9). Total cost for bilateral procedure is Rupees 41000 (US dollars 506). Total cost of surgical ligation of Gonadal vein at AKUH is ranges from Rupees 45000 (US dollars 555.5) to Rupees 90000 (US dollars 1111) .

Discussion: Percutaneous embolization technique was compared with surgical ligation in terms of cost effectiveness and hospital stay and found superior even when compared with results given in international journals.

Conclusion: Gonadal vein embolization technique is far superior to surgical ligation technique in term of short hospital stay, cost effectiveness, lowest morbidity, and least discomfort, as well as early return to work.

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Introduction:

Term varicocele denotes an abnormal degree of venous dilatation of Gonadal vein with or without collateral channels. Varicocele diagnosis was made on physical examination as described by Dubin and Amelar[1,2] and in many cases confirmed on ultrasound and Doppler examination.

Percutaneous Gonadal Vein Emoblization is non-invasive technique used to obliterate the varicocele so as to obviate the need of surgery, thus relief the symptoms and effort to restore the male infertility. This technique is also employed in cases where recurrence of varicocele occurs after surgery or previous Percutaneous Embolization.

Surgical ligation of varicocele can be done at deep inguinal ring level, superficial inguinal

ring, and scrotal level. Another way to ligate the varicocele is laparoscopic ligation. Percutaneous Embolization technique is cost effective method which can be done as an outpatient basis, no anesthetic complications as no anesthesia required, use of drugs including analgesics and antibiotics usually not necessarily required.

Material and methods:

This is a basically retrospective study. Total patients presented for varicocele treatment were 108 and all patients had clinical varicocele. 93 patients out of 108 cases presented with infertility i.e. 86% and 15 patients (14%) with physical complain of scrotal pain, swelling and or scrotal mass. 48 patients (44%) out of these 108 cases, underwent percutaneous embolization by coil primarily and 60 patients (56%) had surgical ligation of Gonadal vein. 18 patients out of 48 cases (after failure to percutaneous embolization in 13 patients and recurrence of varicocele in 6 patients, one lost on follow up), secondarily underwent surgical ligation. Total number of patients had surgical ligation were 78. 65 patients under went high inguinal ligation including 12 bilateral high ligation, laparoscopic ligation of Gonadal vein was carried out in 11 cases including 3 bilateral, while in four patients, inguinal ligation was performed.

In 108 patients age range was 12-65 years with mean age 32 years.

Duration of follow up in embolization group of patients was 1 – 4 years with mean of 2.1 years. Follow up period was ranged between 1-6 years with mean 3 years in surgical ligation group.

Varicocele diagnosis was made on physical examination as described by Dubin and Amelar 1, 2 and in many cases confirmed on ultrasound and Doppler examination.

Results:

Duration of hospital stay for high ligation group was 1-6 days with mean duration of 2.8 days, 1-3 days with mean duration of 1.8 days for laparoscopic group and 2-3 days with mean duration of 2.3 days for inguinal ligation group (table 1).

Hospital stay for patients in embolization group was 30 minutes to 2 hours with mean duration of 75 minutes.

Total cost of Gonadal vein embolization unilaterally at AKUH is 35000 rupees 432.9 us dollar. Total cost for bilateral procedure is 41000 rupees 506 us dollar. Total cost of surgical ligation of Gonadal vein at AKUH is ranges from 45000 rupees 555.5 us dollar to 90000 rupees 1111 us dollars (table 2) as different surgical techniques are employed i-e high inguinal ligation, low inguinal ligation, retroperitoneal ligation, laparoscopic ligation (cost shows wide range because it depends upon whether surgery is carried out on day care basis or patient is admitted for surgery, procedure carried out under local anesthesia or general anesthesia)

Discussion:

Hospital stay was significant for high inguinal ligation group 1-6 days with mean 2.8 days versus Laparoscopic group 2-3 days mean 2.3 days (Table 1). While in literature[3] hospital stay and time of recovery was 2.6 days for high inguinal ligation group and 6.4 days for Laparoscopic ligation group.

Laparoscopic ligation group in our study has shown short duration of hospital stay as compared to mentioned in one study[4] while results of high inguinal ligation group are comparable in two studies. Another study[5] showed duration of hospital stay for laparoscopic group is 3.3 days and 2.3 days for sub inguinal group, while off work days were 4-6 days with mean 4.3 days, and 2.5 off work days for sub inguinal group. In another study[6] , hospital stay duration for surgical ligation group was 2-6 days and days off work were 0-42 days so our surgical results are far encouraging than reported results. Hospital stay was 2-4 hours and days off work were 1-3 days for embolization group, which is significantly, differ to surgical results in our study.

Reported[7] costs of open surgical ligation and laparoscopic ligation are much higher than our cost and percutaneous embolization cost is 2-3 times more than our costs (table 2)(cost mentioned in

Table 1: *Comparison for Hospital Stay in different Surgical Group*

Description	Duration (days)	Mean duration (days)	Total Patients
High Inguinal Ligation group	1-6	2.8	66
Laparoscopic Ligation group	1-3	1.8	11
Inguinal ligation group	2-3	2.3	4

Table 2: *Comparisons of costs of local procedures versus costs published in journal*

	Costs in local study		Costs published in journals	
Procedure	Cost (Rs.)	Cost in US dollars	Cost in US dollars [1]	Cost in US dollars [2]
Percut emb Unilateral	35,000	432	1,009	--
Percut emb Bilateral	41,000	506	1,114	--
Low-inguinal unilateral	45,000	555.5	572	3,317
Low inguinal bilateral	55,000	679	660	4,055
High inguinal unilateral	45,000	555.5	572	3,317
High inguinal bilateral	55,000	679	660	4,055
Laparoscopic unilateral	70,000	864	1,200	6,695
Laparoscopic bilateral	80,000	987.6	1,422	7,099

table in our study for surgery are taken at lowest level of the range given above i-e surgery is carried out on day care basis or patient admitted in general ward). Another study[8] mention cost of laparoscopic ligation and open surgical ligation, many times more than our mentioned costs (table 2). So surgical ligation costs and percutaneous embolization cost at our institution is significantly far more cost effective than reported figures.

While cost of percutaneous embolization is significantly lower than surgical cost at our institution and reported figures. Percutaneous embolization and surgical ligation at our institution for the treatment of infertility are much more cheaper as compared to latest treatment (IVF, IUI, ICSI,ART) for infertility in terms of cost effectiveness[9,10,11,12,13,14].

Summary:

Our study was conducted in order to evaluate whether embolization by coil has advantages over traditional surgical ligation practiced locally or internationally and also to compare local embolization practice with that of internationally practiced percutaneous embolization technique in respect to, hospital stay and cost effectiveness.

The study demonstrates significant advantages of percutaneous embolization by coils over others in terms of shorter hospital stay (only few hours) and less discomfort as well as cost effectiveness.

The benefits of percutaneous embolic therapy for varicocele extend beyond its high technical and clinical success rates, equivalency to surgical therapies in terms of outcomes. It is a minimally invasive, outpatient procedure that allows quick patient recovery, minimal discomfort compared with surgery, and shorter time to return to work (typically within1–2 d) and full activities.

It is cost effective relative to surgery as the procedural costs are less or similar, but embolization has the financial advantage in that shorter recovery time minimizes inconvenience and loss of potential working days. It is also showed that patients who underwent both embolization and surgical ligation expressed a strong preference for embolization. Additional advantages to the embolization approach are that bilateral varicocele can be treated at a single setting via the same venous access, and that it has a high technical success rate in treating recurrent Varicocele post surgical ligation .Our surgical results are either comparable or show advantages over published data in terms of cost effectiveness, and hospital stay

Conclusion:

Gonadal vein embolization technique is far superior to surgical ligation technique in term of short hospital stay, cost effectiveness, lowest morbidity, and least discomfort, as well as early return to work and this is especially most suitable for people of poor socioeconomic countries like Pakistan.

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