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Original Research Article

ROLE OF MICROSCOPIC SUB INGUINAL APPROACH IN MANAGEMENT OF VARICOCELE IN SUB FERTILE MEN POPULATION

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Abstract

Background: Varicocele is usually painless, an abnormal tortuous dilation and enlargement of venous pampiniform plexus in the scrotum. In literatures there is clear and compelling evidence that surgical repair of clinically significant varicoceles in infertile males with abnormal semen parameters can significantly improve sperm counts, motility, morphology, and pregnancy rates. **Materials and Methods:** In this study all sub fertile male patients, were clinically examined screened and evaluated. Patients having abnormal semen parameter on semen analysis suspected varicocele were further evaluated inform of USG scrotum with Doppler study. A total of 40 patients who having varicocele with semen abnormality confirmed by investigations were included in the study. All the patients in the study were offered repair of varicocele by microscopic sub inguinal approach. On Follow up, parameters assessed were, history and clinical examination every 3 months, at regular interval Semen analysis, spontaneous pregnancy rate. **Results:** Majority of the enrolled patients in this study were between ranges from 24 to 36 yrs. fifteen patients were smokers with infertility duration range from 2 to 6 years. Out of total forty patients, 29 patients had varicocele on the left side. 2 patients had only on the right side.9 patients had bilateral. Gr-I, Gr-II and Gr-III were in 8 pts 12 pts and 20 respectively. After surgery, sperm counts showed statistically significant improvement from 13.8 ± 6 million/ml to 16.2 ± 6.4 million/ml ($p<0.05$). Sperm motility also showed statistically significant improvement from 37.8± 5.1 % to 40.1± 6.1 % ($p<0.05$) after surgery. **Conclusion:** We concluded that infertile couple should be thoroughly screened, examined and evaluated. Varicocele is one of the common and surgically repairable reason for infertility in male population. The microsurgical sub inguinal is very good option to improve semen parameter, to increase chances of spontaneous pregnancy in properly evaluated infertile male having clinically palpable varicocele with semen abnormality.

INTRODUCTION

Being a usually painless medical condition, Varicocele is an abnormal tortuous dilation and enlargement of venous pampiniform plexus in the scrotum which drains blood from each testicle.[1] On affecting testicular growth by elevating intratesticular temperature varicoceles are clinically significant because they are the most commonly identified cause of semen analysis abnormality in form of low sperm count, immotile sperm, and abnormal sperm.[2]

On examination there will be cough impulse and bag of worms can be palpable.[3] Varicoceles occur in approximately 15% to 20% of all males but are found in about 40% of infertile males. It is unclear exactly how a varicocele impairs the production, structure, and function of sperm, although there are several theories.

The association between clinically significant varicoceles grading and male infertility is well known.[4] Nowadays in available literatures there is clear and compelling evidence that microscopic surgical repair of clinically significant varicoceles in infertile males with abnormal semen parameters can significantly improve sperm counts, motility, morphology, and pregnancy rates.[5,6]

MATERIALS AND METHODS

In this study all sub fertile male patients, were clinically examined screened and evaluated. Clinical presentation with scrotal pain or discomfort, bags of worms, total forty patients having abnormal semen

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parameter on semen analysis suspected varicocele were further evaluated in form of USG scrotum with Doppler study at department of urology, B.J. medical college, Ahmedabad.

We have included the patient having primary infertility with clinically significant varicocele and at least one abnormal semen parameter on semen analysis with normal fertile wife on evaluation. We have excluded the patient having secondary infertility, azoospermia and couples having female infertility factors. On history taking detailed occupational, sexual history, past and family history any drugs or until now used treatment modalities used if any were evaluated. After general examination genital examinations for any penile abnormalities like chordee, hypospadias etc. was done. The testes were palpated for their consistency and size. The epididymis was palpated for induration and any cystic changes, the spermatic cords were examined to identify the presence of a varicocele, digital rectal examination for the examination of the prostate and the seminal vesicles abnormality. Routine Investigations in forms of Complete Haemogram, bleeding time, clotting time, Urine for albumin, sugar, microscopic examination, Blood for urea, creatinine, sugar, serology tests, Urine for Culture and sensitivity.

For Semen analysis, three days of sexual abstinence prior to specimen collection was advised. The specimen was examined within two hours of collection. Three specimens from each patient were examined over a period of two months to give an assessment of baseline spermatogenesis. The semen was analyzed regarding the following parameters. Volume, Viscosity, Time of liquefaction, pH, sperm Concentration, Motility, sperm morphology and Fructose concentration

All the suspected subclinical patients were subjected to scrotal ultrasonography in order to confirm the diagnosis of varicocele. Varicocele appears in the ultrasonography as cluster of cysts or a serpiginous tubular structure exhibiting minor to moderate dilatation. Doppler study was done on suspected subclinical patients during the resting phase

During Valsalva manoeuvre,[7] the flow parameter and reflux were noted. Ultrasonography of the abdomen was done for the patients with the following indication. In order to rule out the presence of abdominal and retroperitoneal lesions presenting as a varicocele.

All the patients in the study were offered repair of varicocele by sub inguinal approach. In cases of bilateral varicoceles, both the sides were operated at the same sitting. Our operative procedure steps are: The inguinal area is prepped and draped in the standard sterile fashion. A small transverse incision is made just inferior to the level of the external ring. In the case of bilateral varicocelectomies the incision should be symmetrical. The Campers and Scarpa's fascia is divided using electrocautery.[8] Langenbeck retractor provides access to the spermatic cord as it traverses the pubic tubercle. The spermatic cord is then bluntly mobilized. The retractors are removed, and the surgeon's index finger is passed beneath the spermatic cord. This maneuver is facilitated by rolling the spermatic cord over the operating surgeon's index finger with a peanut sponge. Once the cord has been adequately mobilized a 6 Fr infant feeding tube is passed beneath the spermatic cord. Gentle traction on the infant feeding tube elevates the spermatic cord to the level of the incision. Care should be taken to avoid overzealous retraction as this may result in occlusion of the spermatic artery. The ilioinguinal nerve is identified and gently retracted away from the field of dissection.[9] We use loupe for magnification for better haemostasis, identification and preservation of testicular arteries and lymphatics and avoidance of inadvertent injuries. The external spermatic fascia is then opened in the direction of the fibers using bipolar electrocautery. The use of bipolar electrocautery minimizes the potential for thermal injury to adjacent structures. The vascular packet within the spermatic cord is immediately visualized. The internal spermatic artery and the surrounding veins are usually easily identified at this point. If the artery is clearly identified, the larger veins can be ligated and then divided. This approach prevents the complications of recurrence, testicular injury, and hydrocele formation. It is not unusual to encounter minor bleeding during the dissection of the blood vessels. Local pressure with a peanut sponge or gauze is usually sufficient to control this bleeding. When necessary, a bipolar cautery may be employed. This is rarely necessary.

The spermatic, cremasteric, and deferential arteries are preserved, as are the lymphatics. The lymphatics should be preserved to prevent the formation of a hydrocele. Once all the venous channels are ligated, the area external to the spermatic cord is examined for the presence of external cremasteric vessels. Upward traction on the infant feeding tube will expose these vessels which are seen perforating the floor of the canal and entering the cord distally. External cremasteric veins are ligated and divided while the arteries are preserved.

The incision site is then irrigated with normal saline, and the cord structures are returned to their normal anatomic position. Gentle traction of the ipsilateral testicle allows the testicle and the cord to return to their normal anatomic position. The Scarpa's fascia is closed using 3-0 vicryl suture and the skin is approximated using 3-0 Monocryl in subcuticular fashion. Patient is discharged on POD-1. On follow up parameters assessed were, History and clinical examination – Every 3 months interval Semen Analysis – Every 3 months interval. Spontaneous Pregnancy rate – in follow up for 12 months.

RESULTS

On completion of the study the following results are available based on our detailed evaluation of 40

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varicocele patients. Majority of the enrolled patients in this study were from young age population between ranges from 24 yrs to 36 yrs. fifteen patients were smokers with the median duration of infertility in our group of patients was 3 and half years with a range from 2 to 6 years. Out of total forty, 29 patients had varicocele on the left side. 2 patients had only on the right side.9 patients had bilateral varicocele. Only 34 of the 40 varicocele patients in our study were diagnosed clinically. Grade distribution from Gr-I, Gr-II and Gr-III were in 8 pts 12 pts and 20 respectively. The size of the testis was normal in length in 38 patients. While only in two patient sizes of testis were abnormal and were relatively flaccid. Preoperative Semen analysis showed following abnormalities.

Six patients who were suspected to have subclinical varicocele were subjected to the ultrasonography of the spermatic cord (bilateral). All the six patients of subclinical varicocele who demonstrated dilated veins in the spermatic cord in the B mode of the ultrasonography were subjected to the Doppler study. All these six patients showed normal flow during the resting phase and reflux was present during the Valsalva maneuver. Both ultrasonography (spermatic cords) and the Doppler study were done to diagnose subclinical varicocele. Ultrasonography of the abdomen was done to rule out any intra-abdominal or retroperitoneal lesions which may cause varicocele by compression on the internal spermatic veins.

All the patients in our study underwent microsurgical subinguinal varicocelectomy. They were discharged the subsequent day if they had no complications. No major complications seen except mild wound infection in three pts managed with oral antibiotic and daily dressing and one patient had wound dehiscence on 6th post-operative day which was corrected by secondary suturing. All the patients were asked to come for follow up investigations at 3, 6, 9 and 12 months after surgery. During the follow up the following parameters were assessed. Detailed clinical history including the history of conception or pregnancy, Semen analysis Ultrasonography and Doppler study at 6 months post operatively to detect disappearance of spermatic reflux.

After regular the follow up, our study showed results in form spontaneous pregnancy rate in 13 out of 40 patients (32.5%) which could be able to impregnate. There was no significant increase in the size of testis among all the 40 patients in our study. For most of the patients the best semen analysis parameter was achieved 6-12 month after the operation. On post-operative semen analysis, the volume, viscosity, pH, fructose value and liquefaction time were normal.

There was a significant increase in the sperm concentration in the post-operative follow up period in the majority of our patients.18 of the 28 patients (64.3%) in the oligospermic category (< 16 X 106/ml) became normospermia (>16 X 106/ml).The remaining 10 patients in the "oligospermia" category continued to remain in that category although all these patients also showed an increase in the sperm concentration compared to their pre-operative levels. The 12 patients in the "normospermia" category had their sperm concentration further improves in the post-operative period. In other word 30 of the 40 patients (75%) in our study come under the "normospermia" category in the post-operative follow up period as compared to only 12 of the 40 patients (30%) preoperatively. Of the 30 patients in the <39 million category, 18 patients (60%) had their total sperm count increases to the >39 million' category in the follow up period. The remaining 12 out of 30 patients in the < 39 million' category had their total sperm count remain in the same < 39 million' category after the operation. But initial 10 patients in our study who were already in the >39 million category preoperatively continue to remain in the >39 million category although the majority of men had their total sperm count further increased. Thus 28 patients (70%) came under the >39 million category post operatively as compared to 10patients (25%) of the 40 patients before the operation. 14 of the 37 patients with decreased sperm motility (<42% forward) had a significant increase in their sperm motility (>42% forward).3 patients who had good sperm motility before operation continued to have the same after operation. We found only 3 of the 40 patients (7.5%) had good sperm motility before operation as compared to 17 of the 40 patients (42.5%) after operation.12 of the 34 patients (35.3%) who had shown morphological changes in their sperm ("stress pattern") had a change in their sperm morphology to that of a normal pattern after surgery. Thus only 22 of the 40 patients (55%) continue to show morphological changes ("stress pattern") (10) in their sperms after operation as compared to 34 of the 40 patients (85%) before operation.

Only 15 of the 40 patients had ultrasonography (spermatic cord) and the Doppler studied during in post-operative follow-up. None of these patients showed dilated vein in the spermatic cord and showed no reflux.

After surgery, sperm counts showed statistically significant improvement from 13.8 ± 6 million/ml to 16.2 ± 6.4 million/ml ($p<0.05$). Sperm motility also showed statistically significant improvement from 37.8± 5.1 % to 40.1± 6.1 % ($p<0.05$) after surgery.

Table 1: Pre-operative semen analysis details.

Volume	Normal
Viscosity	Normal
pH	Normal
Liquefaction Time	Normal
Sperm concentration (Density)	<16 X 106 /ml (oligospermia) in 28 patients. >16 X 106/ml in 12 patients
Total sperm count	<39 million in 30 patients

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	>39 million in 10 patients
Motility	37 patients had decreased sperm motility 3 patients had good sperm motility
Morphology	34 patients showed stress pattern
Fructose concentration	Normal

Table 2: Present study findings- Significant impact of varicocelectomy operation on semen parameters

Participants	Pre-Op Sperm Count(106/mL)	Postop Sperm Count(106/mL)	p value	Pre-Ope Sperm Motility (%)	Postop Sperm Motility (%)	p value
40	13.8 ± 6	16.2 ± 6.4	<0.05	37.8± 5.1	40.1± 6.1	<0.05

Table 3: Comparison of pregnancy rate in various studies

Name of study	Pregnancy rate
Present Study	32.5 %
Joel L Marmar et al.	29.3 %
Hai Thanh Ohan et al.	26.7%
Ju Taeseo et al.	60 %
Taha A. Abdel-Meduid et al.	32.9 %

DISCUSSION

In our study of varicoceles majority of the patients belonged to the 24 to 36 years age group with a median duration of infertility of three and half years. Total 72.5 % of the varicoceles in our study belong to the left side. Differences in the venous drainage of the left and right testicular vein may account for the left side predominance. The left testicular vein drains into the left renal vein whereas the right testicular vein drains into the inferior vena cava. In addition, there is a higher incidence of abnormal venous valves on the left side than on the right side. The left renal vein may be compressed between the superior mesenteric artery and the aorta.

Most of the patients in study were diagnosed clinically (85 %) whereas 15% of the patients with subclinical varicocele were diagnosed by ultrasound and Doppler study.[11-13] Among the clinically diagnosed varicocele majority were Grade III. Majority of patient in our study had normal testicular size and semen volume, viscosity, there by implying that there is no correlation between them and varicocele. Overall semen concentration (density) less than 16 million/ml and the total sperm count of less than 39 million were seen in 70% to 75% in our patients with varicocele.

Similarly decreased sperm motility and altered sperm morphology were seen in 85% to 93% of our patients. There was a significant improvement in these parameters after varicocelectomy. Of the 40 patients in our study 13 patients (32.5%) could spontaneously impregnate. Further follow up of these patients would show whether there is any significant increase in pregnancy rate following the surgical repair of varicocele.

Current evidence indicates that microsurgical varicocelectomy is the most effective among the different varicocelectomies techniques.[14] A Cochrane review reported that microsurgical sub inguinal varicocelectomy probably improves pregnancy rates slightly more compared to other surgical treatments.[15]

Spontaneous Pregnancy is the ultimate goal for infertility patients and because of than we accepted spontaneous pregnancy rate as the primary outcome measure, while any changes in semen parameters in postoperative compared to baseline semen parameter were used as a secondary outcome. Investigations using semen parameter changes as the primary outcome measures for the efficacy of varicocele treatments provide only indirect evidence. Besides, semen parameters demonstrate extensive intra- and inter individual variability.

A study by Joel L. Marmar et al,[16] carried out on 71 infertile men. The procedure combined microdissection of the spermatic cord at the external inguinal ring, ligation of the dilated veins. These procedures were performed on an outpatient basis and usually with local anaesthesia. The surgery was completed within 20 to 30 minutes, and the postoperative morbidity was minimal. Twenty-four cases were followed for at least 18 months postoperatively. Among this group, the mean values for sperm density and sperm motility increased after surgery. The pregnancy rate among this group was 29.3%, which is very much near to our study pregnancy rate of 32.5%.

A study by Hai Thanh Phan et al,[17] aims to evaluate the safety and effectiveness of scrotal–inguinal microsurgical varicocelectomy in treating male infertility. They prospectively studied preoperatively and postoperatively (at 3 and 6 months) 86 consecutive patients diagnosed with varicocele, abnormal semen parameters, and infertility, undergoing scrotal–inguinal microsurgical varicocelectomy. The semen test was performed before surgery and at 3 months and 6 months after surgery. The reproductive events were short-term followed up. The median age of the patient was 32.9 ± 5.1 (20–43). Two cases (2.7%) had a minor infection of the scrotum incision, who were well treated by appropriate antibiotics. After operation, total sperm count and the percentage of motile sperms at 3 months and 6 months were significantly higher than those pre-varicocelectomy, respectively. In total, 26.7% (23/86) of all couples achieved a

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spontaneous pregnancy in compare to 32.5% pregnancy rate in our study. Late complications such as testicular atrophy, hydroceles, and recurrent varicocele have not occurred.

A study by Ju Tae Seo et al,[18] sperm counts improved significantly after microsurgical varicocelectomy. In the drug group, however, sperm parameters did not significantly improve after treatment. In comparison to our study's pregnancy rate of 32.5%, Natural pregnancy rates were 60.0% in the surgery group, 34.5% in the drug group, and 18.7% in the observation group of same study. The natural pregnancy rate of the surgery group was higher than the other groups, and there were statistically significant differences among the three groups.

In a study by Taha A. Abdel-Meguid et al,[19] analysed 145 participants of which 72 in control arm and 73 in treatment arm. Baseline characteristics in both arms were comparable. Spontaneous pregnancy was achieved in 13.9% (Control group) versus 32.9% (Treatment group), with an odds ratio (OR) of 3.04 (95% confidence interval. In Control group's analysis, none of semen parameters revealed significant changes from baseline (sperm concentration [p = 0.18], progressive motility [p = 0.29], and normal morphology [p = 0.05]). Conversely, in Treatment group's analysis, the mean of all semen parameters improved significantly in follow-up versus baseline ($p < 0.0001$). In between-arms analysis, all semen parameters improved significantly in the Treatment Arm versus Control Arm ($p < 0.0001$). No significant adverse effects were reported.

Thus, our study findings were consistent with many previous studies that varicocele repair had a positive impact on semen parameters. In addition, microsurgical approach for varicocele repair in clinically palpable varicocele in infertile male population is very well established and accepted. However, our study has few limitations like smaller sample size, shorter follow-up, and non-easy availability of assisted reproductive techniques were known as the reasons for the spontaneous pregnancy rate in this study being lower than that in other previously reported studies.

CONCLUSION

On the conclusion of this study, we found that there is high prevalence of varicocele in male general population. Varicocele is one of the common and surgically repairable reason for infertility in infertile male. Though Varicocele can produce a progressively toxic effect on the testes and if untreated patient may end up in irreversible damage to spermatogenesis and finally infertility. But not necessarily every case of varicocele will lead to infertility. So, every male partner of infertile couple should be thoroughly screened, examined and evaluated to differentiate symptomatic, clinically significant varicocele having abnormal semen parameter from subclinical varicocele having normal semen parameter.

A microsurgical subinguinal approach using its optical magnification during varicocele repair has made it easier to identify and ligate the spermatic veins and to preserve the spermatic arteries and lymphatic vessel. This approach has lower adverse effects, less recurrence chances, shorten hospital stay, minimum morbidity. Every infertile couple should properly explain that some men who undergo this procedure may fail to show any postoperative improvement in spermatogenesis and should evaluate other causes of infertility and may need for any ARTs procedure in future. Larger sample size and longer follow up are needed to support our finding and to identify the group of patients who are very likely to improve from varicocele repair. Thus, we conclude that microsurgical subinguinal is very good option to improve semen parameter, to increase chances of spontaneous pregnancy in properly evaluated infertile male having clinically palpable varicocele with semen abnormality.

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