VARICOCELECTOMY IN THE MANAGEMENT OF MALE INFERTILITY

by

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During the last 25 years a number of documented reports have reviewed the potentially detrimental role of varicocele on the fertility of man (Russel, 1954, Scott, 1958, Charny 1962, MacLeod 1965, Brown *et al* 1967 and Dubin and Amelar 1971). The impaired spermatogenesis produced by this venous circulatory disturbance is obvious from the characteristic alteration in semen quality (MacLeod, 1965) and the abnormal testicular morphology (Dubin and Hotchkiss, 1969).

Tulloch (1952) was the first to perform the operation of ligation of internal spermatic vein to restore the fertility of an azoospermic man with varicocele. Since then many reports (Table I) have confirmed the beneficial role of varicocelectomy on subfertile men with varicocele. Currently, varicocelectomy has become the most effective therapeutic modality in the entire field of male infertility.

TABLE I

Effect of Varicocelectomy on Male Infertility

Name of author(s)	Year	Improvement in semen cytology (%)	Pregnancy rate (%)
Tulloch	1955	66	30
Charny	1962	64	—
Scott and Young	1962	70	—
Hanley and Harrison	1962	70	30
MacLeod	1965	70	41
Zorgniotti and MacLeod	1966	70	40
Brown, et al	1968	55-60	43
Dubin and Hotchkiss	1969	75	33
Dubin and Amelar	1970	81	48
Dubin and Amelar	1971	71	55
Brown	1976	58	41
Present series	1977	82	34

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Accepted for publication on 31-8-1977.

In our male infertility work-up, it was observed that varicocele is the second commonest factor affecting the fertility of man, and this venous disturbance was present in 26% of the infertile men investigated (Rajan, 1977). Analysis of semen quality in these men revealed oligospermia and hypokinesis in 64% of cases, and stress pattern of abnormal sperm morphology described by MacLeod, in more than 50% of cases, (Rajan and Pillai, 1978). In the subsequent report, the changes in the testicular morphology associated with varicocele were studied, and germinal layer hypoplasia with premature sloughing of immature cells was demonstrated as the predominent feature (Rajan and Thomas, 1978). In this paper we present our results of varicocelectomy performed on 41 subfertile men, in terms of improvement in semen quality and successful pregnancies. The prognostic role of testicular biopsy, performed prior to or at the time of varicocelectomy is also evaluated in this presentation.

Material and Methods

During the last 2 years (August, 1975 to June, 1977), 41 varicocelectomies were performed on subfertile males with varicocele. In 3 subjects, since the lesion was bilateral, ligation was done on both sides. Age of the 41 men operated ranged from 23 to 48 years, with the highest concentration in the 30 to 40 years. Period of infertility in them ranged from 1 year to 8 years.

The infertility was confirmed in all these men prior to surgery, by at least two semen analysis. Their female partners were investigated and any infertility problem was ruled out in them. Varicocele correction was not performed in any male with an established endocrinopathy.

The operation performed consisted of a complete, high ligation of the internal spermatic venous system, at the internal inguinal ring in the extraperitoneal space. An effort was made to preserve the internal spermatic artery and lymphatics which course in close proximity to the veins. Inadvertent injury to the artery may result in damaging histologic changes in the testis. By preserving the lymphatics the infrequent complication of hydrocele of the tunics vaginalis can be minimised.

Bilateral testicular biopsies were performed either prior to or at the time of varicocelectomy in many of the cases, for assessing the prognosis. These patients were followed-up postoperatively by regular semen analysis at 2-monthly intervals.

Of the 41 patients operated 12 men were excluded from the study for the following reasons: 2 patients were azoospermic; 4 were operated recently (less than 2 months); and the remaining 6 patients had inadequate follow-up. Hence the analysis related only to the 29 oligospermic men who reported for regular follow-up after operation.

Results

Table II discloses the semen quality in the 29 subjects before and after varicocelectomy. Substantial improvement in semen quality following ligation was shown in 24 cases (82.80%), and there were 9 cases of pregnancy yielding a con-

TABLE II

Semen Quality Before and After Varicocelectomy in 29 Different Men

Analysis	Sperm count (million/ml)	Motility (%)
Before ligation	19.90	36.60
After ligation	43.30	62.10

ception rate of 34.50% (Table III). Of the 29 cases, 3 had bilateral varicoceles, and, following bilateral varicocelectomy, all were improved and in 1 there was pregnancy. All the 9 men who succeeded in impregnating their wives, did so within 3 to 14 months following varicocelectomy.

TABLE III

Results of Varicocelectomy in 29 Subfertile Men

Results	No. of patients	Percentage
Semen quality improved	24	82.80
Semen quality not improved	5	17.20
Pregnancies	9	34.50

The pre- and postoperative relationship of semen quality in the 24 improved patients is shown in Table IV and V. The sperm count and motility rose in a comparatively impressive fashion, while the improvement in sperm morphology was less remarkable. A scrutiny of semen quality of the 9 men who succeeded in impregnating their wives, revealed a comparably impressive rise in sperm count, as it did for the entire group, while the motility attained even better levels. The greater improvement in motility seen in the successful group was thought to be the major factor responsible for the favourable outcome.

With the limited number of biopsies, no definite relation could be established between the testicular histology and the post-ligation seminal improvement. All

TABLE IV

Sperm Count Before and After Correction in 24 Improved Cases

	Sperm count in million/ml					
	0-5	6-10	11-20	21-40	41-60	above 60
Before ligation	9	3	5	4	1	2
		70.80%			12.50%	
After ligation	0	3	4	8	2	7
		29.00%			37.50%	

TABLE V

Sperm Motility Before and After Correction in 24 Improved Cases

	motility percentage				
	0-20	21-40	41-60	61-80	81 and above
Before ligation	9	8	7	0	0
	70.80%		29.20%		
After ligation	0	2	11	2	9
	8.30%		91.70%		

the different testicular pattern were demonstrated in the improved as well as the unimproved groups.

Sperm Count: Average sperm count rose from 19.90 to 43.30 million/ml. In the successfully treated group the average sperm count improved from 16 million to 48 million/ml, as against the unimproved group where the sperm count was 38 million and 21 million/ml respectively. It was observed that those men with an initial sperm count of less than 10 million/ml fared in a more favourable manner than those with an initial sperm count of more than 10 million/ml. Preoperatively, 17 (70.80%) men had a sperm count of less than 20 million/ml and 12 (50%) had less than 10 million/ml; only 12.50% had a sperm count in the normal range of 40 million/ml and above. After ligation, 7 (29.00%) had a sperm count of less than 20 million/ml and 3 (12.50%) had a sperm count of less than 10 million/ml; whereas in 9 (37.50%) the sperm count was improved to 40 million/ml or more. (Table IV).

Sperm Motility: Sperm motility is the single indicator of sperm viability, and it is expressed in terms of percentage of the total number of oval forms. The average motility for the entire series improved from 36.60% to 62.10% (Table II), while in the successfully treated group it improved from 38% to 68%. Preoperatively, 17 (70.80%) of the men had a motility of less than 40%; and only 7 (29.20%) had motility in the normal range of more than 40%; whereas, after ligation 2 men (8.30%) had a motility of less than 40% and 22 (91.70%) had a motility range of above 40%. The normal motility attained by this group of men who had essentially poor quality sperms constituted the most impressive improvement in semen quality achieved following varicocelectomy (Table V).

Sperm Morphology: The healthy seminiferous tubules generally produce a preponderance of adult sperms with oval shaped heads. The abnormal appearing sperms have been classified by MacLeod (1965), and under certain stress conditions like varicocele, immature forms or spermatogenic precursor cells also appear in the ejaculate. This "stress pattern" of sperm morphology has been demonstrated in 60% of the cases. Following ligation there was no marked decrease in the abnormal sperm morphology. Rather, the stress pattern persisted in 7 out of 9 men who successfully impregnated their wives.

Pregnancy Rate: Table III gives the pregnancy rate following correction of varicocele. It was observed that these men who succeeded in impregnating their wives belonged to a low sperm count group of less than 10 million/ml. While varicocelectomy had definitely improved the sperm count, the change in sperm motility was more spectacular. Probably, the enhanced sperm motility was the major factor responsible for the favourable outcome.

Discussion

Varicocelectomy, an easy surgical procedure, is often an effective therapeutic modality in the management of the selected subfertile males. When varicocele is associated with poor semen quality, and when endocrinopathy and female infertility problems stand ruled out, ligation of internal spermatic venous system should be offered as the treatment of choice. An improvement in semen quality ranging from 64% to 81% and a pregnancy rate ranging from 30% to 55% have been reported by various authors (Table I).

The mechanism by which varicocele adversely affects spermatogenesis is still not entirely clear. Whether varicocele in itself is responsible or whether it is merely one manifestation of a more complex pathologic state is not, as yet, known. It would be reasonable to claim that varicocele is uniformly detrimental. Varicocelectomy not only treats the venous tortuosity but often also corrects the underlying deleterious, pathologic process.

In our study, varicocelectomy has been found to improve the sperm count to a considerable extent. But pregnancies have occurred often with a very low sperm count, which is not customarily considered adequate for normal fertility. However, in all these cases the unique feature was the excellent improvement in sperm motility in a meaningful manner. There was not much change in the stress pattern following varicocelectomy. These findings further support the existing attitude that sperm motility is the single most important factor of sperm quality required for fertilisation. It is almost obvious that varicocelectomy promotes fertility by improving sperm motility than by its effect on the other parameters of semen quality.

While the role of testicular biopsy in varicocele is not clearly understood, Etriby *et al* (1967) have demonstrated a definite correlation between testicular histology and improvement of semen quality. According to these authors, premature sloughing associated with germinal layer hypoplasia carried the best prognosis, the next in order being spermatogenic arrest. Dubin and Hotchkiss (1969) have reported that over 50% of the patients who showed improvement following ligation, exhibited germinal layer hypoplasia with premature sloughing. However, the unimproved group in their series did not show any specific histologic study, eventhough different histological changes were encountered, there was no specific histolog cal pattern which carried better prognosis over the other.

Conclusion

Varicocelectomy performed in a group of subfertile men has improved the semen quality in 82.80% and yielded a pregnancy rate of 34.50%. This study does not establish the prognostic value of testicular biopsy in subfertile men with varicocele. Varicocelectomy must be the preferred mode of treatment when varicocele affects spermatogenesis and is responsible for the infertility.

Acknowledgement

The authors are thankful to Dr. J. S. Sathyadas, the medical superintendent, for his kind permission to use the hospital records.

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