Varicocele Embolization and Serum Testosterone: What is the Evidence?

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• Stock: A4L, Calgary Scientific, Endologix, Harmonic Medical, Ikomed, Lombard Medical, Middletoe Industries, Inc., NDC
• Consultant/Advisory Board: Boston Scientific
Varicocele

- abnormally dilated veins in pampiniform plexus
- Retrograde flow spermatic vein
- Most frequently asymptomatic
Varicocele Rx - Traditional Indications

- infertility + appropriate semen abnormalities
- groin pain
- adolescent varicocele
  - testicular atrophy
Varicocele

- Due to retrograde flow in the internal spermatic venous system
- 35° optimal temp for spermatogenesis
- Counter current exchange by the cord
Varicocele

- Due to retrograde flow in the internal spermatic venous system
- $35^\circ$ optimal temp for spermatogenesis
- Counter current exchange by the cord
Scrotal air conditioner

A. Jung, M. Eberl and W-B. Schill Reproduction, 2001 121:595
Left Renal Venogram
Hand injected
Infusion TDS Left Spermatic Vein

3% TDS
2 cc diluted with 0.5 cc contrast
Deployment 38 – 8 -10 coil
Varicocele Embolization With Glue
Varicocele Embolization Sclerosant Alone

- Gandini et al
- TDS foam
- 280 varicoceles in 244 pts
- Technical success 97.1%

Men with normal semen quality

- Sperm not capable of fertilizing oocyte
- Harbor genetic abnormalities prevent normal fetal development
New Measures of Spermatid Function

- Seminal reactive oxygen species
- DNA Fragmentation Index
- Abnormal sperm chromatin condensation

J Urol 2008; 179:639–642
A Correlation Between Varicocele and Testosterone?

Elevation of serum testosterone and free testosterone after embolization of the internal spermatic vein for the treatment of varicocele in infertile men

Yigal Gat¹, Michael Cornish², Alexander Belenky² and Gil N Rachar²,³

Table I. Sperm quality and testosterone and free testosterone levels in infertile patients (n = 83) treated for varicocele

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-embolization</th>
<th>Post-embolization</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testosterone (nmol/l)</td>
<td>12.07 ± 6.07</td>
<td>17.22 ± 8.43</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>Free testosterone (nmol/l)</td>
<td>5.93 ± 2.44</td>
<td>10.21 ± 7.69</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>Sperm count (× 10⁶/ml)</td>
<td>7.49 ± 1.73</td>
<td>18.14 ± 2.36</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>Motility (%)</td>
<td>21.74 ± 2.47</td>
<td>34.47 ± 2.27</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>Morphology (%)</td>
<td>6.63 ± 1.07</td>
<td>13.08 ± 1.44</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>Testosterone (nmol/l) by grade of varicocele</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade I (n = 22)</td>
<td>11.82 ± 6.42</td>
<td>17.07 ± 7.17</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>Grade II (n = 39)</td>
<td>12.23 ± 4.06</td>
<td>20.63 ± 9.61</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>Grade III (n = 22)</td>
<td>11.96 ± 6.70</td>
<td>18.10 ± 7.65</td>
<td>P &lt; 0.001</td>
</tr>
</tbody>
</table>
A Correlation Between Varicocele and Testosterone?

Is varicocele prevalence increasing with age?

U. Levinger¹, M. Goren³, Y. Gat³ & G. N. Bachar²

1 Department of Medicine B, Rabin Medical Center, Petah Tikva, Israel;
2 Department of Radiology, Rabin Medical Center, Petah Tikva, Israel;
3 Andrology and Radiology Unit, Mayani Hayehuda Medical Center, Bnei Brak, Israel

Testosterone production and it is reversible by appropriate treatment, it raises two interesting and important issues to be studied: (i) it is possible that varicocele accelerates the process of the ageing male. (ii) It is possible to retard, at least partially, the process of ageing in men by adequate treatment of bilateral varicocele.
Why You Need MORE Testosterone

- Depression
- Lack of Focus
- Constant Fatigue
- Decreased Muscle Mass
- Man Boobs
- Abdominal Fat
- Low Libido & Erection Problems
- Decreased Athletic Performance

- Elevated Mood
- Mental Focus
- Confidence
- Increased Muscle Mass
- Decreased Body Fat
- Healthy Heart
- Strong Erections & High Sex Drive
- Maximum Athletic Performance

Man w/ Low Testosterone

Man w/ High Testosterone
A Brief History

- 1975 - Comhaire & Vermeulen (1975) decreased plasma testosterone in varicocele patients
- 1984 - Varicoceles cause Leydig cell dysfunction
- 1995 - Varicocelectomy can significantly increase testosterone

- J Clin Endocrinol Metab 1975;40:824–829
- J Androl 1984;5:163–170
- J Urol. 1995;154:1752-1755
THE EFFECT OF VARICOCELECTOMY ON SERUM TESTOSTERONE LEVELS IN INFERTILE MEN WITH VARICOCELES

LI-MING SU, MARC GOLDSTEIN AND PETER N. SCHLEGEL
From the Division of Male Reproductive Medicine and Microsurgery, James Buchanan Brady Foundation, Department of Urology, New York Hospital-Cornell Medical Center and Center for Biomedical Research, Population Council, New York, New York

ABSTRACT

Purpose: We evaluated the effect of varicocelectomy on serum testosterone.

Materials and Methods: We retrospectively reviewed the effect of varicocelectomy on serum testosterone levels in 53 infertile men with varicoceles.

Results: Mean serum testosterone increased from a preoperative level of 319 ± 12 to 409 ± 23 ng./dl. postoperatively (p <0.0004). Men with at least 1 firm testis preoperatively had a greater increase in serum testosterone (p <0.005). An inverse correlation was noted between preoperative testosterone levels and change in testosterone after varicocelectomy (r = −0.34, p <0.013).

Conclusions: Varicocelectomy can increase serum testosterone for infertile men with varicoceles. Although improvement in serum testosterone does not necessarily cause a direct improvement in semen quality, varicocelectomy may improve hormonal and spermatogenic function.
Fig. 1. Mean serum testosterone levels increased after varicocelectomy with $p < 0.0004$ (*).

Fig. 3. Men with at least 1 firm testis had greater increase in serum testosterone after varicocelectomy compared to those with bilaterally soft testes with $p < 0.005$ (*).
Varicocelectomy Is Associated With Increases in Serum Testosterone Independent of Clinical Grade

Wayland Hsiao, James S. Rosoff, Joseph R. Pale, Jonathan L. Powell, and Marc Goldstein

OBJECTIVE
To determine whether the varicocele grade is related to the degree of improvement in serum testosterone levels after varicocelectomy.

MATERIALS AND METHODS
We performed a retrospective review of men with a total serum testosterone level <400 ng/dL who had undergone microsurgical subinguinal varicocelectomy for infertility and/or hypogonadism. All men had clinically palpable left varicoceles and preoperative and postoperative total serum testosterone levels available. For patients with bilateral varicoceles, the greatest grade on either side was used to stratify the patients. The men with an isolated, left-side, grade I varicocele were not offered varicocelectomy. The changes in the testosterone levels were evaluated, with the results expressed as the mean ± standard error. \( P \leq 0.05 \) was considered statistically significant.

RESULTS
A total of 59 patients had undergone bilateral varicocelectomy and 19 unilateral varicocelectomy. Overall, an increase in testosterone was seen in 65 of the 78 men (83%) in the present study. The mean follow-up was 7 months. The mean serum testosterone level increased from 308.4 to 417.5 ng/dL, with a mean increase of 109.1 ± 12.8 ng/dL (\( n = 78 \)). The improvements in the serum testosterone levels were seen regardless of the clinical grade.

CONCLUSION
Hsiao et al

- 59 men
- Surgical Rx
  - 40 bilateral
  - 19 unilateral
- Mean 7 month follow up
Hsiao et al

- 65 / 78 (83%) increase testosterone
- Mean serum testosterone
  - Pre 308.4 ng/dL
  - Post 417.5 ng/dL
- Mean increase 109.1 ± 12.8 ng/dL
Varicoceles
Premature Ejaculation and Testosterone

First International Journal of Andrology

Impact of varicocelectomy on premature ejaculation in varicocele patients
1 Department of Urology, Al-Azhar University, Cairo, Egypt;
2 Department of Urology, Salman Bin Abdul-Aziz University, Al-Khaz, Saudi Arabia;
Varicoceles
Premature Ejaculation and Testosterone

Table 2 The mean IIEF-5 and PEDT scores at baseline and end of study in both groups

<table>
<thead>
<tr>
<th></th>
<th>Group I (varicocelectomy group) (n = 73)</th>
<th>Group II (control group) (n = 56)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>At end of study</td>
</tr>
<tr>
<td>PEDT</td>
<td>15.56 ± 2.50</td>
<td>11.37 ± 4.25</td>
</tr>
<tr>
<td>Serum TT, ng ml⁻¹</td>
<td>331.89 ± 56.85</td>
<td>357.97 ± 53.14</td>
</tr>
<tr>
<td>IIEF-5</td>
<td>23.27 ± 1.23</td>
<td>23.41 ± 1.08</td>
</tr>
<tr>
<td>Testicular size, cc</td>
<td>9.94 ± 2.59</td>
<td>10.15 ± 2.47</td>
</tr>
</tbody>
</table>

Values are presented as mean ± standard deviation and percentages.
+, increased; −, decreased; IIEF-5, international index of erectile function-5; PEDT, premature ejaculation diagnostic tool; TT, total testosterone.
Take Home Points – Varicocele Embolization and Testosterone

• Effect of varicocele on testosterone production widely accepted
  – Conflicting data on benefit of varicocele Rx

• Controlled studies needed to define relationships between varicocele, varicocele Rx, and testosterone levels
All of the following statements about varicoceles and serum testosterone are true except except

• 1. The data regarding varicocele Rx and changes in serum testosterone is variable
• 2. The association between varicocele and low serum testosterone is well accepted
• 3. A small proportion of testosterone is produced in the adrenal gland
• 4. Serum testosterone rises with age
• 5. The mechanism by which varicoceles affect serum testosterone is unknown
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All of the following statements are true except:

1. The effect of varicocele treatment on testosterone levels is independent of pretreatment serum testosterone levels
2. Most circulating testosterone is bound to testosterone-binding globulin
3. Spermatic vein reflux may affect systemic serum testosterone distribution
4. Serum testosterone levels fluctuate throughout the day
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