Effects of Thymosin on the Secretion of the Sexual Hormone in Rats with Experimental Varicocele

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Summary: Hormonal abnormality in experimental varicocele induced by partial ligation of left renal vein and the effect of thymosin (fraction 5) on the secretion of the sexual hormone were studied in rats. Serum testosterone level was lowered after varicocele formation, but could be reversed or increased by intraperitoneal administration of thymosin 5 mg/rat twice a week for 4 weeks with concomitant increase of testicular testosterone content. Changes in FSH and LH both in serum and testis, determined with immunoassay method as that of testosterone, were insignificant as compared with control or thymosin treated groups.

Key words: thymosin, sexual hormone, experimental varicocele, testis

Varicocele is generally considered as an important factor for infertility in men with varicocele. A number of studies show that the precise mechanism by which varicocele causes infertility has as yet been not known. Recent studies, however, have demonstrated that sexual hormonal abnormality is one of the causes of infertility due to varicocele. Some investigators reported that the status of endocrine function of the gonadal axis may play an important role in the regulation of reproductive function. Gonadal activity is not only related to thymic function, and thymic hormone participates in the regulation of sexual hormonal function. This study was undertaken by creating a model of experimental varicocele by partial ligation of the left renal vein in rats, into which thymosin was injected, to determine sexual hormonal levels of serum and testicular tissue in these rats. The purpose of this paper was to explore the significance and mechanism of the abnormality in secretion of sexual hormone in infertility due to varicocele and the regulative function of thymosin in the reproductive endocrine.

MATERIALS AND METHODS

35 adult male Wistar rats, weighing 230-250g, were divided at random into three groups: 1) the control group, in which animals were operated on as shams (n=12); 2) the untreated group, in which animals had no injection of thymosin; though an ex-
Experimental model of left-side varicocele was induced \((n=11)\); and 3) the treated group, in which animals with left varicocele received an injection of thymosin \((n=12)\).

35 animals were anesthetized with pentobarbitone intraperitoneally \((40 \text{mg} / \text{kg} \text{ip})\). A midline incision was made to expose the left renal vein. After blunt dissection around the left renal vein, 12 rats were not ligated in order to secure animals receiving sham operation as a control group. A total of 23 rats were used as a model of experimental varicocele, a 1.02 mm in diameter metal probe was placed among the left adrenal vein, spermatic vein and inferior vena cava. Then, the left renal vein was ligated with the metal probe by a 4-zero silk. Finally, the probe was removed, the approximate 1.02 mm in diameter left renal vein as varicocele was produced. Three months after the operation, 12 of 23 rats received intraperitoneal injections of thymosin \((0.5 \text{ mg per rat}, \text{ twice a week for } 4 \text{ weeks})\).

Finally, the eyeballs of the rats were removed in order to collect blood, Then, serum was centrifuged. At the same time, bilateral testicles were resected. Testes were smashed by glass stick and filtered through nylon net. The filtrates were then centrifuged at 5000 \(r/min\) for 10 min. The levels of T, FSH and LH in the serum and supernatant of the filtrates were estimated by radioimmunoassay \((\text{RIA})\), in which double tubes were used for each sample and an average value was calculated. The intraassay coefficient of variation was 1.91\%, 4.98\% and 4.84\% respectively for T, LH and FSH \((\text{Radioimmunoassay reagents were kindly provided by the Isotopic Company, Institute of North Immune agents, China})\).

The results were expressed as \(\bar{x} \pm s\). And analysis of variance or rank sum test was processed by an IBM/PC computer in order to detect the difference among the groups.

**RESULTS**

The levels of T, FSH and LH in the serum

Table 1 shows a considerable lower level of T in the serum in the untreated group as compared with the control group \((P<0.01)\). After administration of thymosin, the level of T had a significant rise \((P<0.01)\). Among the three groups, there was no significant difference in the levels of FSH and LH in the serum \((\text{table 1})\).

The levels of T, FSH and LH in the bilateral testis

As can be seen from table 2, the level of T in the bilateral testicular tissue in the untreated group was lower than that in the control group as well as in the treated group. However, statistically significant difference was observed in the levels of T \((P<0.01)\). The change of LH levels in the bila-

<table>
<thead>
<tr>
<th></th>
<th><strong>T</strong> (ng/ml)</th>
<th><strong>FSH</strong> (mIU/ml)</th>
<th><strong>LH</strong> (mIU/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group</td>
<td>184.38±73.91</td>
<td>1.70±0.47</td>
<td>10.29±5.40</td>
</tr>
<tr>
<td>Untreated group</td>
<td>30.50±23.74*</td>
<td>4.61±3.28</td>
<td>14.36±12.52</td>
</tr>
<tr>
<td>Treated group</td>
<td>180.92±135.79**</td>
<td>1.87±1.00</td>
<td>10.15±5.84</td>
</tr>
</tbody>
</table>

* \(P<0.01\), as compared with control group;
** \(P<0.01\), as compared with untreated group,