

THE EFFECT OF PREDNISONE ON SERTOLI CELL OF CONTRALATERAL TESTICULAR TORSION

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ABSTRACT

Objective: To evaluate the effect of prednisone in unilateral testicular torsion on Sertoli cell quality of contralateral testis. **Material & Method:** Thirty Wistar rats were divided into three groups i.e. group A (sham procedure), group B (unilateral torsion + orchiectomy after 6 hours), and group C (unilateral torsion + orchiectomy after 24 hours). Group B and C were further divided into subgroup with and without Prednisone administration. Prednisone was given orally once a day an hour after torsion, continued till one month later. Orchiectomy of contralateral testis was performed one month later. Those testes were examined by a pathologist. **Results:** In group A, no abnormality on Sertoli cell quality was found. There is significant difference among groups in Sertoli cell quality ($p = 0,01$). Ischemic time is associated with Sertoli cell quality (2 rats with severe damage in group C and none in group B). In group B and C, prednisone administration inhibited Sertoli cell damage. Prednisone administration in 6 hours group gave better results than 24 hours group (3 rats vs 1 rat with good Sertoli cell quality). **Conclusion:** Sertoli cell in contralateral testis is significantly affected by unilateral testicular torsion. Prednisone inhibit Sertoli cells damage. Ischemic time affected Sertoli cell quality of contralateral testis and respond to prednisone.

Keywords: Prednisone, unilateral testicular torsion, sertoli cell.

ABSTRAK

Tujuan Penelitian: Mengevaluasi pengaruh pemberian Prednison dan lama iskemik pada torsio testis unilateral terhadap kualitas sel sertoli testis kontralateral. **Bahan & Cara:** Tiga puluh tikus Wistar dikelompokkan menjadi tiga kelompok, yaitu kelompok A (prosedur Sham), kelompok B (torsio unilateral + orkiopeksi + orkiektomi setelah 6 jam), dan kelompok C (torsio unilateral + orkiopeksi + orkiektomi setelah 24 jam). Grup B dan C dikelompokkan lagi menjadi kelompok dengan dan tanpa Prednison. Prednison diberikan per oral sekali sehari, satu jam setelah torsio sampai 30 hari selanjutnya. Orkiektomi kontralateral dilakukan 30 hari kemudian. Testis tersebut diperiksa oleh satu orang patolog berpengalaman. **Hasil Penelitian:** Pada kelompok A, tidak ditemukan kelainan kualitas sel sertoli. Terdapat perbedaan yang signifikan antar kelompok dalam hal kualitas sel sertoli ($p = 0,01$). Lama iskemik berhubungan dengan kualitas sel sertoli (3 tikus dengan kerusakan berat pada kelompok C vs tidak ada di kelompok B). Pada kelompok B dan C, Pemberian Prednison terlihat menghambat kerusakan sel sertoli. Pemberian Prednison pada kelompok 6 jam memberikan hasil yang lebih baik dari pada kelompok 24 jam (3 tikus vs 1 tikus dengan kualitas sel sertoli yang baik). **Simpulan:** Kualitas sel sertoli kontralateral terpengaruh secara signifikan oleh torsio testis unilateral. Lama iskemik mempengaruhi kualitas sel sertoli kontralateral.

Kata kunci: Prednison, torsio testis unilateral, kualitas sel sertoli.

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INTRODUCTION

Fertility can be maintained by one testis. However, unilateral testicular torsion may reduce

fertility. The effect of unilateral testicular torsion to contralateral testicular structure and function has not been established. Recent studies showed controversial results.¹

Some researchers found that unilateral torsion affected contralateral testis, and influenced fertility. Janetschek et al² and Goldwasser et al³ found no association between unilateral torsion and structural changes of contralateral testis, sperm analysis, and Antisperm Antibody (AsAb) induction. Viguera et al⁴ found that treatment of unilateral testicular torsion affected contralateral testis. Goto⁵ found an association between unilateral torsion and Sertoli cell damage in contralateral testis, the changes occurred after 3-5 weeks, which include Sertoli cells only tubule. He also found that autoimmune process caused this damage. Lin et al⁶ found that unilateral torsion influenced blood flow and histological changes in contralateral testis, which lead to Sertoli cell damage.

Sertoli cell as nutrition provider for germ cells, plays an important role in spermatogenesis. Many researches showed that Sertoli cell changes affected spermatogenesis in many infertility cases.⁷ The effect of AsAb to Sertoli cell structural and function has not been established. In theory, the arrangement of Sertoli cell make it possible to contact with germ cell line in one side and immune system in other. Therefore, there is a possibility that AsAb may target Sertoli cell.

The application of corticosteroid, as immunosuppressive agent, is still limited. Sade et al⁸ studied the effect of cortisone in rats, and found that cortisone (24 hours after torsion continued until 4 weeks) and detorsion gave better results than surgical alone. Gulmez et al⁹ found that prednisolone increased spermatogenesis and Leydig cell proliferation. Prednisolone injection also prevented testicular structural damage. Cortico-steroids is a potential treatment to reduce contra-lateral testicular damage in unilateral torsion. However, the evidence is still limited.¹⁰⁻¹³

OBJECTIVE

The aim of the study is to evaluate the effect of prednisone in unilateral testicular torsion on Sertoli cell quality of contralateral testis.

MATERIAL & METHOD

In this experimental study, thirty 60-day-old Wistar rats were classified into three groups i.e. group A (sham procedure) (5 rats), group B (unilateral torsion + orchiectomy after 6 hours) (10 rats), and group C (unilateral torsion + orchiectomy

after 24 hours) (10 rats). Group B and C were further divided into subgroup (5 rats each) with and without Prednisone administration. Body weight measurement was performed after 7 days acclimatization period. Artificial testicular torsion was performed by left testicular exploration, torsion 1080 counter clockwise, and orchiopexy with Prolene 6-0. Prednisone (1 mg/Kg BW) was given orally once a day an hour after torsion, continued till one month later. Orchiectomy of contralateral testis was performed one month later.

Surgical procedure included artificial testicular torsion and orchiectomy (6 hours or 24 hours after torsion) at the beginning and orchiectomy of contralateral testis at the end of the study (one month after torsion). Rats were under general anesthetic, with intramuscular ketamine (100 mg/kg BW). Antibiotic (ceftriaxone) and analgetics (mefenamic acid) were given perioperatively. Surgical wound was closed with chromic catgut 4-0.

After surgical procedure, rats were kept in similar environment, include same diet and fluid intake. At the end, contralateral testis was removed and analyzed by a pathologist to evaluate Sertoli cell quality.

Sertoli cell quality was evaluated and graded for mild, moderate, or severe damage, based on the following criteria: increased intracellular granules, decreased lipid droplets, cytoskeletal changes, organel changes, rough and elongated nucleus.¹⁴ Sertoli cell damage was classified base on percentage of normal Sertoli cell found in three slides of seminiferous tubules: severe (< 25%), moderate (25-50%), mild (50-75%), normal (> 75%).

RESULTS

Mean body weight of subjects was 209 g (4,3 g), and not significantly difference among groups ($p > 0,05$).

Table 1 describes the difference of Sertoli cell quality in groups. There was significant difference in Sertoli cell quality among groups. There was no Sertoli cell damage in control group. In group B, Prednisone improved Sertoli cell quality (3 of 5 rats with normal Sertoli cell). In group C, prednisone also shows similar effect, 2 rats without prednisone showed severe damage and none with normal appearance. Ischemic time also influenced Sertoli cell quality (group B2 vs C2). Two of 5 rats in B2 showed good Sertoli cell quality compare to none

Table 1. Comparison of Sertoli cell damage among groups.

Group	Sertoli cell Damage				Total
	Normal	Mild	Moderate	Severe	
A (sham procedure)	10	0	0	0	10
B1 (6 hours torsion + prednisone)	3	2	0	0	5
B2 (6 hours torsion without prednisone)	2	1	2	0	5
C1 (24 hours torsion + prednisone)	1	1	3	0	5
C2 (24 hours torsion without prednisone)	0	0	3	2	5
Total	16	4	8	2	30

in group C2. Prednisone in group B1 (6 hours torsion) gave better result than in group C1 (3 rats vs one rat with normal Sertoli cell).

DISCUSSION

Significant change occurred on Sertoli cells in contralateral testis after unilateral testicular torsion. Sertoli cells has nutritional effect in normal spermatogenesis. Evidence suggests that many spermatogenesis disorders was associated with Sertoli cell damage. This study found Sertoli cell damage in contralateral testis in patients with unilateral testicular torsion. This change may be caused by auto-immune process against Sertoli cell, which was induced by unilateral testicular torsion. Testicular torsion induces ischemia, which may alter the continuity of blood testis barrier. The blood testis barrier discontinuity may facilitate germ cell antigen exposure to the immune system, which might lead to autoimmune induction.⁷⁻¹⁴

Ischemic time also influenced the quality of Sertoli cells. This finding was supported by similar studies world wide. Sertoli cell quality in 6 hours torsion group was worse than in 24 hours group. The longer ischemic time might induce more damage on blood testis barrier. Prednisone administration in 6 hours torsion group gave better result than in 24 hours group. Despite its effect on immune suppression, prednisone also reduce inflammation and damage of blood testis barrier, which limited antigen exposure. Prednisone was found to be able to inhibit autoantibody molecules to “attack” Sertoli and germinal cells. Those mechanisms may explain the protective effect of prednisone to Sertoli cell damage in unilateral testicular torsion.⁷⁻¹⁴

CONCLUSION

Sertoli cell quality was significantly affected by unilateral testicular torsion. Prednisone

inhibited Sertoli cell damage. Ischemic time may influence the outcome of prednisone in unilateral testicular torsion.

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