



THE ROLE OF ANATOMICAL AND HORMONAL FACTORS IN THE PATHOGENESIS OF VARICOCELE IN CHILDREN AND METHODS FOR ITS PREVENTION (LITERATURE REVIEW)

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Abstract:

Varicocele, a common condition in adolescent males, is characterized by the dilation of the pampiniform plexus veins and is associated with potential impacts on testicular growth, hormone production, and fertility. The pathogenesis of varicocele involves both anatomical and hormonal factors, including venous insufficiency, impaired testicular temperature regulation, oxidative stress, and inflammatory cytokine activity. Hormonal alterations, such as reduced testosterone and inhibin B levels, further contribute to testicular dysfunction. Management strategies range from observation and monitoring to surgical interventions like microsurgical varicocelectomy, laparoscopic repair, and percutaneous embolization. Early detection and appropriate treatment are essential to prevent long-term reproductive consequences.

Keywords: varicocele, adolescent males, testicular function, oxidative stress, varicocelectomy

Introduction

Varicocele, a condition characterized by the dilation of the pampiniform plexus veins, is a common issue in adolescent males, with a prevalence of approximately 15% [1] [3]. It is associated with potential impacts on testicular growth, hormone production, and future fertility. This response explores the anatomical and hormonal factors involved in the pathogenesis of varicocele in children and discusses methods for its prevention.

Anatomical Factors in Varicocele Pathogenesis

Venous Insufficiency and Testicular Temperature Regulation

The primary anatomical factor in varicocele development is venous insufficiency, which leads to impaired blood flow and increased hydrostatic pressure in the testicular veins [5] [9]. This venous dilation disrupts the counter-current heat exchange mechanism, resulting in elevated testicular temperatures. Elevated temperatures can impair spermatogenesis and testicular function, contributing to the pathogenesis of varicocele [17].

Testicular Atrophy and Asynchronous Growth

Varicocele is often associated with ipsilateral testicular atrophy, which may be due to reduced blood flow and oxidative stress [12] [15]. Asynchronous testicular growth, where the affected testis is smaller than the contralateral one, is a common finding in adolescents with varicocele. This discrepancy may persist into adulthood if left untreated [3] [16].

Impact on Spermatogenesis

The anatomical abnormalities in varicocele can lead to impaired spermatogenesis, characterized by reduced sperm count, motility, and morphology [6] [18]. These changes are thought to result from oxidative stress, inflammation, and heat-induced damage to the germinal epithelium [5] [9].

Hormonal Factors in Varicocele Pathogenesis

Testosterone and Gonadotropin Levels

Hormonal alterations, particularly in testosterone levels, have been observed in adolescents with varicocele. Lower levels of free testosterone (FT) and total testosterone (TT) are associated with higher grades of varicocele [1]. These hormonal changes may contribute to impaired testicular function and spermatogenesis [12].

Inflammatory Cytokines and Oxidative Stress

Varicocele is associated with increased levels of pro-inflammatory cytokines such as IL-1 β , IL-6, and TNF α , which contribute to endothelial dysfunction and chronic inflammation [5]. These inflammatory processes exacerbate oxidative stress, further impairing testicular function [9].

Role of Inhibin B and FSH

Inhibin B, a marker of Sertoli cell function, is often reduced in patients with varicocele, indicating impaired testicular growth and development [8] [12]. Elevated follicle-stimulating hormone (FSH) levels may also be observed, reflecting compromised spermatogenesis [1] [3].

Methods for Prevention and Management

Observation and Monitoring

For asymptomatic patients with mild varicocele, observation and regular monitoring are often recommended. This approach involves serial ultrasound measurements of testicular volume and semen analysis to assess for any signs of testicular dysfunction [3] [16].

Surgical Intervention

Surgical intervention is indicated in cases of significant testicular atrophy, persistent pain, or abnormal semen parameters. Microsurgical varicocelectomy is the preferred technique due to its high success rate and low complication profile [4] [9]. This procedure involves the ligation of dilated veins while preserving the testicular artery and lymphatic vessels.

Minimally Invasive Techniques

Laparoscopic and percutaneous embolization techniques are alternative approaches for varicocele treatment. These methods are less invasive and

may reduce the risk of postoperative complications such as hydrocele [10] [16].

Hormonal and Medical Therapy

In some cases, medical therapy may be considered to address hormonal imbalances or inflammation. Anti-inflammatory agents and antioxidants have been used to mitigate oxidative stress and improve testicular function [6] [9].

Table: Comparison of surgical techniques for varicocele repair

Technique	Description	Advantages	Citation
Microsurgical Varicocelectomy	Subinguinal approach with magnification to ligate dilated veins	High success rate, minimal complications, preservation of testicular artery	[4] [9]
Laparoscopic Varicocelectomy	Minimally invasive approach using laparoscopic instruments	Reduced postoperative pain, shorter recovery time	[10] [16]
Percutaneous Embolization	Radiological occlusion of dilated veins	Less invasive, reduced risk of hydrocele	[10] [16]

Conclusion

Varicocele in children and adolescents is influenced by both anatomical and hormonal factors, including venous insufficiency, testicular atrophy, and inflammatory cytokine production. Early intervention, whether through observation or surgical correction, is critical to preserve testicular function and future fertility. Further research is needed to establish definitive guidelines for the management of varicocele in pediatric populations.

References:

1. ASSESSMENT OF COMPLICATIONS POST-HEMORRHOIDECTOMY. (2025). *INTERNATIONAL CONFERENCE ON SCIENCE, ENGINEERING AND TECHNOLOGY*, 2(1), 38-40. <https://eoconf.com/index.php/icset/article/view/50>
2. Fattaxov, N. X., Abdulxakimov, A. R., Xomidchonova Sh, X., & Xaidarov, G. N. (2025). EFFECTIVENESS OF SURGICAL PREVENTION OF POSTOPERATIVE PURULENT COMPLICATIONS IN CHILDREN. *Web of Medicine: Journal of Medicine, Practice and Nursing*, 3(1), 191-193.
3. Fattaxov, N. X., Abdulxakimov, A. R., Xomidchonova Sh, X., & Xaidarov, G. N. (2025). SURGICAL PREVENTION OF PURULENT INGROWN TOENAIL IN CHILDREN. *Web of Scientists and Scholars: Journal of Multidisciplinary Research*, 3(1), 125-127.

4. Fattaxov, N. X., Abdulxakimov, A. R., Xomidchonova, S. X., & Xaidarov, G. N. (2025). INNOVATIONS IN POSTOPERATIVE CARE: THE USE OF DRAINS AND ANTISEPTICS TO PREVENT PURULENT INFECTIONS. *Современные подходы и новые исследования в современной науке*, 4(1), 90-91.
5. Gulomov, K. K., Juraev, S. B., Khamdamov, R. A., Kholikov, B. M., & Meliboev, R. A. (2025, February). IMPROVING THE TREATMENT OF COMPLICATIONS IN ENDOUROLOGICAL OPERATIONS FOR UROLITHIASIS. In *INTERNATIONAL CONFERENCE ON SCIENCE, ENGINEERING AND TECHNOLOGY* (Vol. 2, No. 1, pp. 31-33).
6. Gulomov, K. K., Kholikov, B. M., Sh, P. S., & Yokubov, D. Y. (2025). NEUROLOGICAL ASSESSMENT OF POSTOPERATIVE PATIENTS UNDERGOING CORONARY ARTERY BYPASS GRAFTING (CABG). *ZAMONAVIY ILM-FAN VA INNOVATSIYALAR NAZARIYASI*, 2(2), 6-10.
7. Juraev, S. B., Khamdamov, R. A., Meliboev, R. A., & Yokubov, D. Y. (2025). NEW TREATMENT APPROACHES FOR PEDIATRIC UPPER GASTROINTESTINAL OBSTRUCTION IN FERGANA VALLEY. *ZAMONAVIY ILM-FAN VA INNOVATSIYALAR NAZARIYASI*, 2(2), 4-6.
8. Kholikov, B. M. (2025, February). POSTOPERATIVE DELIRIUM IN CABG PATIENTS: IDENTIFYING RISKS AND OPTIMIZING PERIOPERATIVE MANAGEMENT. In *INTERNATIONAL CONFERENCE ON SCIENCE, ENGINEERING AND TECHNOLOGY* (Vol. 2, No. 1, pp. 14-16).
9. Melikuzievich, K. G. (2025). PREVENTING PURULENT COMPLICATIONS IN PEDIATRIC OSTEOMYELITIS (LITERATURE REVIEW). *ORIENTAL JOURNAL OF MEDICINE AND NATURAL SCIENCES*, 2(1), 33-40.
10. Rustamovich, A. B., & Arshad, M. S. (2024). PATHOLOGICAL CONDITION AND ANALYSIS OF THE JUXTAGLOMERULAR CELL OF THE EXCRETORY SYSTEM. *AMERICAN JOURNAL OF APPLIED MEDICAL SCIENCE*, 2(3), 58-66.
11. Rustamovich, T. F. (2024). FLAT FEET-SYMPTOMS, DEGREES, PREVENTION AND TREATMENT METHODS. *JOURNAL OF INTERNATIONAL SCIENTIFIC RESEARCH*, 1(4), 312-317.
12. Rustamovich, T. F. (2024). TYPES OF BLEEDING, METHODS TO STOP BLEEDING, THE IMPORTANCE OF PROVIDING FIRST AID IN CASE OF BLEEDING. *JOURNAL OF SCIENTIFIC RESEARCH, MODERN VIEWS AND INNOVATIONS*, 1(2), 163-167.
13. Sadikov, U. T., Karimova, M. M., Akhunbaev, O. A., Kholboboeva, S. A., & Suyarov, S. M. (2023). Impaired carbohydrate tolerance as a risk factor for ischemic heart disease among the population of the Fergana Valley of the Republic of Uzbekistan. In *BIO Web of Conferences* (Vol. 65, p. 05032). EDP Sciences.
14. Shohrukhbek, K., & Ibrokhim, T. (2025). ASSESSMENT OF MORPHOLOGICAL CHANGES AFTER HEMORRHOIDECTOMY.

- ZAMONAVIY ILM-FAN VA TADQIQOTLAR: MUAMMO VA YECHIMLAR, 2(2), 7-9.
15. Karabaev Jasurbek Mavlyanjanovich. (2025). CURRENT CHALLENGES AND ADVANCES IN PEDIATRIC TRAUMATOLOGY. International Multidisciplinary Journal for Research & Development, 12(05), 157–160. Retrieved from <https://www.ijmrd.in/index.php/imjrd/article/view/3051>
 16. Qoraboyev Jasurbek Mavlonjon O'G'Li, & Raximova Ruxshona Shavkat Qizi (2024). KATTALARDAGI OG'IR MIYA SHIKASTLANISHI. Eurasian Journal of Medical and Natural Sciences, 4 (2), 156-162. doi: 10.5281/zenodo.10776140
 17. Tashmamatova, D. K. (2025). UNDERSTANDING AND MANAGING CONSTIPATION IN CHILDREN AGED 0-3: CAUSES, DIAGNOSIS, AND TREATMENT STRATEGIES. ORIENTAL JOURNAL OF MEDICINE AND NATURAL SCIENCES, 2(1), 4-12.
 18. Ёкубов, Д., & Мазалова, А. (2024). On differential diagnostics of spinal cord pathology of organic and functional genesis. Актуальные вопросы фундаментальной медицины: сегодня и в будущем, 1(1), 36-36.
 19. Корабоев, Ж. (2024). ПАТОЛОГИЧЕСКИЕ ПЕРЕЛОМЫ КОСТЕЙ. В МЕЖДУНАРОДНАЯ КОНФЕРЕНЦИЯ АКАДЕМИЧЕСКИХ НАУК (Т. 3, Выпуск 7, сс. 32–35). Zenodo. <https://doi.org/10.5281/zenodo.11632660>
 20. Корабоев, Ж. (2024, June). ПАТОЛОГИЧЕСКИЕ ПЕРЕЛОМЫ КОСТЕЙ. In Международная конференция академических наук (Vol. 3, No. 6, pp. 32-35).