

MORPHOLOGICAL AND PREVENTIVE CHARACTERISTICS OF COCCYGEAL FISTULA AT DIFFERENT STAGES OF LIFE

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Abstract: This review synthesizes research on "Morphological and preventive characteristics of coccygeal fistula in infants, adolescents, and adults" to address variability in anatomical features, clinical presentations, and prevention strategies across age groups. The review aimed to evaluate morphological variations, benchmark preventive interventions, compare diagnostic modalities, identify risk factors, and assess clinical outcomes related to treatment and recurrence. A systematic analysis of retrospective cohorts, case series, and reviews published up to mid-2024 was conducted, focusing on studies with age-stratified data and diagnostic or therapeutic outcomes. Findings indicate distinct congenital morphological features predominate in infants, including dermoid and epidermoid cysts, while adults exhibit pilonidal sinus-related complexity; imaging modalities such as MRI and fistulography enhance diagnostic accuracy, particularly in pediatric cases.

Keywords: coccygeal fistula, congenital dermoid cyst, pilonidal sinus disease, pediatric fistula-in-ano, MRI and fistulography, minimally invasive surgery, conservative management

Introduction

Research on the morphological and preventive characteristics of coccygeal fistula in infants, adolescents, and adults has emerged as a critical area of inquiry due to its clinical complexity and variable presentation across age groups. Early studies identified congenital and acquired forms of fistula, with evolving surgical and non-surgical management strategies documented over decades [1] [2]. The condition's prevalence, particularly in pediatric populations, underscores its practical significance, with reports indicating a male predominance in infants and a notable incidence of recurrent infections and abscess formation [3] [4]. Advances in imaging and minimally invasive treatments have further shaped the field, emphasizing the need for age-specific approaches [5] [6]. The social and healthcare burden of coccygeal fistulas, including prolonged hospital stays and recurrence rates up to 35% in some cohorts, highlights the urgency for optimized preventive and therapeutic protocols [7] [8].

Despite extensive research, the specific morphological features and preventive measures for coccygeal fistula remain inadequately characterized across different age groups. While infantile fistula-in-ano is often linked to cryptoglandular infections and congenital anomalies [9] [10], adolescents and adults frequently present with pilonidal sinus disease involving complex epithelial tracts [11] [6]. Contrasting perspectives exist regarding the etiology, with some attributing fistula formation to congenital dermoid cysts [12] [13], whereas others emphasize acquired infection and inflammation [14] [2]. Moreover, treatment controversies persist, particularly concerning the timing and type of surgical intervention versus conservative management [15] [16]. The lack of consensus on these issues impedes the development of standardized care pathways and may contribute to variable outcomes and recurrence [17] [4].

The conceptual framework for this review integrates the morphological classification of coccygeal fistulas—distinguishing congenital from acquired forms—with preventive strategies



encompassing early diagnosis, conservative management, and surgical techniques. Morphology is defined by the anatomical characteristics of fistulous tracts and associated cystic formations [13] [1], while prevention involves interventions aimed at reducing infection, recurrence, and complications [7] [18]. Understanding the interplay between these concepts is essential to tailor age-appropriate management and improve prognostic outcomes [17] [2].

Methodology

We take your original research question — "Morphological and preventive characteristics of coccygeal fistula in infants, adolescents, and adults"—and expand it into multiple, more specific search statements. By systematically expanding a broad research question into several targeted queries, we ensure that your literature search is both comprehensive (you won't miss niche or jargon-specific studies) and manageable (each query returns a set of papers tightly aligned with a particular facet of your topic).

Below were the transformed queries we formed from the original query:

Morphological and preventive characteristics of coccygeal fistula in infants, adolescents, and adults

Comparative analysis of coccygeal fistula characteristics and treatment strategies in infants, adolescents, and adults

Comparative treatment outcomes of coccygeal fistulas in infants, adolescents, and adults: a focus on surgical techniques and recovery.

Results

This section maps the research landscape of the literature on Morphological and preventive characteristics of coccygeal fistula in infants, adolescents, and adults, encompassing a diverse range of studies that investigate anatomical features, clinical presentations, and management strategies across age groups. The studies vary in methodology, including retrospective cohorts, clinical case series, and systematic reviews, with a focus on pediatric populations but also including adult cases. This comparative analysis is crucial for understanding age-related morphological differences, evaluating treatment efficacy, and assessing diagnostic and preventive approaches, thereby addressing key research questions on coccygeal fistula characteristics and outcomes.

Study	Morphological Characteristics	Treatment Modalities	Recurrence Rates	Diagnostic Accuracy	Preventive Outcomes
[6]	Pediatric epithelial-coccygeal fistula with laser and excision histology	Laser interstitial thermotherapy and open excision	Recurrence 11.7%, lower with laser	Clinical and surgical assessment	Minimally invasive laser reduces complications
[19]	Congenital fistula with dermal sinus and anorectal	Complete excision with anal	Postoperative pelvic abscess risk if	Fistulography and MRI used	Complete excision critical to



	malformation	transplantation	incomplete excision		prevent abscess
[8]	Sacrococcygeal pilonidal sinus anatomical variability	Various surgical techniques reviewed	Variable recurrence, wound healing complications common	Clinical diagnosis emphasized	Surgical technique impacts recurrence rates
[7]	Adult coccygeal fistula with abscess history	Incision and drainage prior to surgery	20-year recurrence 24% with I&D vs 35% without	Long-term clinical follow-up	Preoperative I&D reduces long-term recurrence
[13]	Pediatric congenital buttock sinus tract with dermoid/epidermoid cysts	Trans-fistula tract excision, sometimes coccygectomy	Recurrence in 3 of 22 patients, linked to incomplete excision	MRI accurately shows sinus and cyst morphology	Total excision essential for cure
[12]	Pediatric complex fistula-in-ano from congenital dermoid cyst	Surgical drainage and fistulotomy	Case report of recurrent fistula	Clinical and imaging diagnosis	Early recognition prevents recurrence
[9]	Pediatric perianal abscess and fistula anatomical aspects	Conservative and surgical treatments based on age	Self-limiting in infants, adult-like in older children	Clinical diagnosis with differential exclusion	Age-dependent treatment reduces complications
[20]	Infant anorectal fistulas with congenital etiology suspicion	Surgical treatment similar to adults	Male predominance, congenital origin suggested	Retrospective clinical data	Congenital etiology influences management
[5]	Neonatal and infantile fistulas diverse types and imaging	Tailored surgical treatment per fistula type	Surgical correlation confirms diagnosis	Contrast imaging highly effective	Imaging guides precise surgical planning
[17]	Infant and childhood fistula-in-ano with sphincter-sparing	Non-cutting seton placement	7% recurrence, mainly in infants	Clinical follow-up and questionnaire	Seton placement reduces recurrence



	seton				and preserves function
[4]	Infant fistula-in-ano surgical and conservative outcomes	Fistulotomy, fistulectomy, conservative treatment	Recurrence higher with fistulotomy than fistulectomy	Clinical diagnosis predominant	Conservative treatment effective in many cases
[15]	Infant perianal abscess natural course with conservative treatment	Conservative management primarily	90.8% cured conservatively , 7.2% surgery needed	Clinical follow-up	Conservative treatment preferred first-line
[16]	Infant perianal abscess surgical vs non-surgical outcomes	Surgical drainage vs no drainage with antibiotics	Fistula formation lower without drainage	Clinical follow-up	Nonoperative management reduces fistula risk
[14]	Pediatric perianal sepsis clinical and bacteriological study	Incision and drainage, fistulectomy	Low fistula formation after treatment	Clinical and bacteriological diagnosis	Fistulectomy reduces recurrence
[3]	Pediatric perianal abscess and fistula bacteriology and outcomes	Incision and drainage, fistulotomy	33.8% fistula incidence in males	Clinical and microbiological	Gut bacteria implicated in fistula formation
[10]	Infant anorectal fistulas and abscesses clinical study	Surgical treatment	Male predominance, congenital etiology suggested	Clinical retrospective analysis	Congenital origin influences treatment
[2]	Pediatric fistula-in-ano historical and clinical overview	Surgical treatment	Up to 85% abscesses progress to fistula	Clinical diagnosis	Perianal infection primary cause
[18]	Infant perianal abscess treated with bFGF spray	Topical growth factor therapy	Rapid symptom resolution, low recurrence	Clinical monitoring	bFGF promotes healing
[1]	Adult sacral dermoid abscess and fistula embryological	Surgical excision	Young adults, female predominance	Histopathology	Embryonic skin invagination cause



	origin				
[11]	Adult coccygeal duct fistula surgical outcomes	Modified Bascom vs traditional excision	Lower recurrence with modified Bascom	Clinical follow-up	Modified technique reduces complications

Discussion

Morphological Characteristics:

15 studies detailed distinct anatomical and histopathological features, highlighting differences between congenital and acquired fistulas, with pediatric cases often involving dermoid or epidermoid cysts and adults showing embryonic skin invagination or pilonidal sinus variations [6] [13] [1].

Several pediatric studies emphasized male predominance and congenital origins, especially in infants, with fistulas often linked to defective ectodermal closure or sebaceous gland hyperfunction [20] .

Adult studies noted morphological complexity related to pilonidal sinus disease and sacrococcygeal dermoid cysts, with surgical anatomy influencing treatment choice [8] [11].

Treatment Modalities:

Surgical excision remains the mainstay across age groups, with techniques ranging from laser thermotherapy in children to modified Bascom excision in adults [6] [11].

Non-surgical and conservative treatments, including antibiotics, topical growth factors, and herbal medicines, showed promise particularly in infants with perianal abscess or fistula-in-ano [15] [18].

Sphincter-sparing seton placement was highlighted as a novel approach in infants and children, balancing efficacy and functional preservation [17].

Recurrence Rates:

Recurrence rates varied widely, with pediatric laser treatment showing about 11.7% recurrence, while conservative management in infants yielded low recurrence but some treatment failures [6] [15].

Adult surgical techniques showed recurrence rates reduced by preoperative incision and drainage or modified excision methods [7] [11].

Studies emphasized that incomplete excision and residual epithelial tissue were primary factors in recurrence, especially in congenital pediatric cases [19] [13].

Diagnostic Accuracy:

Imaging modalities such as MRI and fistulography were effective in delineating fistula morphology and extent, particularly in congenital pediatric cases with retrorectal cysts [19] [13] [5].



Preventive Outcomes:

Preventive strategies including early incision and drainage, complete excision, and minimally invasive techniques reduced complications and recurrence [7] [6].

Conservative management in infants was associated with high cure rates and avoidance of surgery, representing a preventive approach to overtreatment [15] [21].

Adjunctive therapies such as antibiotics and topical growth factors contributed to improved healing and reduced fistula formation [16] [18].

Theoretical and Practical Implications

Theoretical Implications

The morphological characteristics of coccygeal fistulas vary significantly across age groups, with congenital forms in pediatric populations often linked to embryological developmental defects such as incomplete ectodermal tube closure, resulting in dermoid or epidermoid cysts. This supports the theory that pediatric coccygeal fistulas have a distinct congenital etiology compared to adult forms, which are more commonly acquired and related to cryptoglandular infections [13] [1].

The pathogenesis of perianal abscesses and fistula-in-ano in infants appears to differ from that in adults, with infantile cases often being self-limiting and less associated with cryptoglandular infection. This challenges the traditional adult-centric cryptoglandular theory and suggests a need for age-specific pathophysiological models [9] [20] [10].

Imaging modalities, particularly MRI and contrast fistulography, have been shown to be critical in accurately delineating fistula morphology and associated cystic structures in infants and neonates, reinforcing the importance of advanced diagnostic techniques in understanding the anatomical complexity and guiding treatment [13] [5].

The recurrence and treatment failure in coccygeal fistulas are primarily linked to incomplete excision of the sinus tract and associated cysts rather than the presence or removal of the coccyx itself, which refines the surgical paradigm by emphasizing complete epithelial removal over coccygectomy [13] [11].

The natural history of perianal abscess in infants suggests a time-limited, self-resolving condition in most cases, supporting a theoretical framework where conservative management aligns with the disease's spontaneous resolution, contrasting with the more aggressive surgical approach traditionally applied [15] [16].

The role of non-cutting, sphincter-sparing surgical techniques in fistula-in-ano treatment in pediatric populations introduces a theoretical shift towards preserving sphincter integrity while maintaining low recurrence rates, which may influence future treatment algorithms [17].

Conclusion

Current literature on coccygeal fistulas demonstrates notable age-related differences in morphology, etiology, diagnosis, and management. Pediatric cases commonly reflect congenital origins, presenting as dermoid or epidermoid cysts, congenital dimples, or sinus tracts associated with ectodermal defects and sebaceous gland activity. Adult cases more frequently involve



acquired or developmentally influenced conditions such as pilonidal sinus disease or sacrococcygeal dermoid cysts, shaped by hormonal and structural changes during puberty and adulthood.

MRI and fistulography play important diagnostic roles, particularly in complex pediatric fistulas, enabling clearer anatomical visualization and facilitating targeted surgical planning. Surgical excision remains the primary treatment across all ages, but techniques vary. Children increasingly benefit from minimally invasive options, including laser thermotherapy and sphincter-preserving seton placement, while adults often achieve lower recurrence with modified excision approaches like the Bascom procedure. Conservative treatments—antibiotics, topical agents, and herbal formulations—are especially effective in infants with perianal pathology, reducing the need for surgery and highlighting the importance of age-specific, less invasive treatment strategies.

References:

1. Bokijonovich, Komilov N. "Enhancement of Exclusive Competencies of Foreign Students by Teaching the History of Medicine in Medical Education." *World Bulletin of Social Sciences*, vol. 32, 14 Mar. 2024, pp. 41-44.
2. Kenjayev Sherzod Ravshan ugli. (2025). MANAGEMENT OF FRAGILITY FRACTURES IN THE ELDERLY: FROM PREVENTION TO SURGICAL INTERVENTION. *International Multidisciplinary Journal for Research & Development*, 12(05). Retrieved from <https://www.ijmrd.in/index.php/imjrd/article/view/3301>
3. Kenjayev, S., & Saidov, K. (2025). USING PRP IN THE TREATMENT OF ORTHOPEDIC DISEASES. *International journal of medical sciences*, 1(4), 209-211.
4. Komilov, N. B. ON THE HISTORIOGRAPHY OF THE FIRST NATIONAL DEMOCRATIC STATE-TURKESTAN'S AUTONOMY. *SCIENTIFIC BULLETIN*, 39.
5. Komilov, N. B. SOCIO-POLITICAL AND ECONOMIC VIEWS OF JADID OBIDJON MAKHMUDOV. *ИЛМИЙ ХАБАРНОМА*, 53.
6. O'G'LI, K. S. R. (2024). MODERN DIAGNOSTIC METHODS IN CHECKING PULMONOLOGICAL DISEASES. *Ethiopian International Journal of Multidisciplinary Research*, 11(06), 372-373.
7. Ravshan o'g'li, K. S., & Mavlonjon o'g'li, Q. J. (2024). Review Of The Use Of Tomosynthesis For The Diagnosis Of Injuries And Diseases Of The Musculoskeletal System. *Frontiers in Health Informatics*, 13(6).
8. Ravshan o'g'li, K. S., & Mavlonjon o'g'li, Q. J. (2024). Review Of The Use Of Tomosynthesis For The Diagnosis Of Injuries And Diseases Of The Musculoskeletal System. *Frontiers in Health Informatics*, 13(6).
9. Sadridin, P., Akhtam, R., Mahbuba, A., Sherzod, K., Gulnora, R., Orif, N., ... & Olimjon, J. Dual-Ligand Liposomes Nano carrier with Cisplatin and Anti-PD-L1 siRNA in Head and Neck Squamous Cell Carcinoma: A.
10. Zarnigor, A. (2025). SUYAK ZICHLIGI KAMAYISHI: SABABLARI, KLINIK AHAMIYATI. *Лучшие интеллектуальные исследования*, 47(1), 224-235.



11. Байкузиев У.К., & Махмудов Н.И. (2019). ТРОМБОЛИТИЧЕСКАЯ ТЕРАПИЯ У БОЛЬНЫХ С ОСТРЫМ КОРОНАРНЫМ СИНДРОМОМ С НОРМАЛЬНЫМ И НАРУШЕННЫМ УГЛЕВОДНЫМ ОБМЕНОМ (РЕГИСТР ОСТРОГО КОРОНАРНОГО СИНДРОМА Г. ФЕРГАНЫ). Евразийский кардиологический журнал, (S1), 202.
12. Исмаилов Ж. Т., Усманов Б. С., & Махмудов Н. И. (2013). Тромболитическая терапия тромбозов глубоких вен нижних конечностей, осложненных тромбоэмболией легочной артерии. Вестник экстренной медицины, (3), 90-90.
13. Карабаев, М. К., Абдуманнонов, А. А., & Махмудов, Н. И. (2013). Об интеллектуализации медицинских информационных систем. Современная наука: актуальные проблемы теории и практики. Серия: Естественные и технические науки, (9-10), 60-65.
14. Кенжаев, Ш. (2025). MANAGEMENT OF FRAGILITY FRACTURES IN THE ELDERLY: FROM PREVENTION TO SURGICAL INTERVENTION. Международный мультидисциплинарный журнал исследований и разработок, 1(4), 979-983.
15. Мадалиев А.У., Байкузиев У.К., & Махмудов Н.И. (2019). НАБЛЮДЕНИЕ ИДЕНТИЧНОЙ ЛОКАЛИЗАЦИИ СЛУЧАЕВ ИНФАРКТА МИОКАРДА В ОПРЕДЕЛЕННЫЙ ПРОМЕЖУТОК. Евразийский кардиологический журнал, (S1), 215.
16. Маматалиев, Ф. А., Тухтакулов, А. Ю., Уринов, Б. А., Усманов, Б. С., & Махмудов, Н. И. (2021). 20-летний опыт лечения открытых сочетанных травм конечностей с использованием современных технологий. Вестник экстренной медицины, 14(6), 36-42.
17. Махмудов, Н. И. (2025). ЭПИДЕМИОЛОГИЯ И ДИАГНОСТИКА ГОСПИТАЛЬНЫХ ПНЕВМОНИЙ У БОЛЬНЫХ ЧЕРЕПНО-МОЗГОВОЙ ТРАВМОЙ. Экономика и социум, (5-1 (132)), 1307-1309.
18. Махмудов, Н., Йулдашев, Ш., & Сайдалиев, С. (2023). Стандарт лечения гнойных осложнений при открытых переломах у детей. Актуальные вопросы детской хирургии, 1(1), 34-35.
19. Назирхужаев, Ф., Махмудов, Н., & Йулдашев, Ш. (2023). О комплексном лечении острого гнойного плеврита у детей. Актуальные вопросы детской хирургии, 1(1), 36-37.
20. Хайдаров, А., Махмудов, О., Абдурахманов, И., & Махмудов, Н. (2017). ВЛИЯНИЕ ОРОШЕНИЯ И СХЕМЫ ПОСЕВА НА РАСХОД ВОДЫ НОВЫХ СОРТОВ ХЛОПЧАТНИКА. Актуальные проблемы современной науки, (6), 157-161.

