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PEDIATRIC SURGERY IN 19TH-CENTURY GREECE: A HISTORICAL ANALYSIS OF THEODOROS ARETAIOS'S CASE RECORDS

PEDIJATRIJSKA KIRURGIJA U 19. STOLJEĆU U GRČKOJ: POVIJESNA ANALIZA ZAPISA SLUČAJEVA THEODOROSA ARETAIOSA

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SUMMARY

The historical examination of pediatric surgery in the 19th century, particularly through the cases managed by Theodoros Aretaios (1829–1893), underscores the complexities and challenges faced by surgeons of that era. Aretaios's experiences with conditions such as atresia and osteosarcoma reveal a lack of specialization in pediatric surgery, as procedures were often adapted from adult practices without fully addressing the unique needs of children. His documentation highlights not only the medical difficulties but also the social implications of treating life-threatening conditions in young patients, emphasizing the evolution of surgical practices and the necessity for a more child-centered approach in modern medici-

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ne. This paper aims to shed light on the development of pediatric surgical care, illustrating how historical practices inform contemporary understandings and methodologies.

Keywords: *pediatric surgery, Theodoros Aretaios, 19th century, greek surgery*

Introduction

The beginning of pediatric surgery in Greece is considered to be the establishment of a separate surgical clinic only for child patients in 1901 at the Children's Hospital "Santa Sophia" in Athens. This clinic was directed by Sokrates Tsakonas (1864–1944) until 1911, and by Demetrios Kokkoris (1870–1963) until 1926, when it was closed. These two famous surgeons for adults, at the time with experience in pediatric surgery gained through their work in Greece and Europe, worked gratis without any other assistants. But in Greece, Pediatric Surgery was acknowledged as a separate surgical specialty only in 1958 (Dolantzas, 2015). Nevertheless, the roots of modern Greek pediatric surgery can be traced back to the 19th century.

When searching for information on pediatric surgery from Greek surgeons in the 19th century, it is essential to note that this does not refer to pediatric surgery as we understand it today (Vladimiros, 2021). Specifically, we must recognize that pediatric surgery was performed by surgeons who handled the entire spectrum of surgical procedures (Kouzis, 1837). On the one hand, there were no specialized surgical fields recognized at that time, and on the other hand, there was no established understanding that pediatric surgery requires adaptation to the nuances of child physiology (Aretaios, 1870).

Pediatric surgery, as understood today, differs significantly from adult surgery. Historical texts on surgical pathology and techniques from earlier periods (Olympios, 1853) lack specific references to pediatric surgery, as a separate entity (Aretaios, 1880). Instead, surgeries performed on children often mirrored established adult practices, regardless of whether they involved conditions unique to pediatric patients due to a limited understanding of child-specific physiology. Therefore, the adult techniques applied to children often did not account for their unique needs.

This approach adhered to the surgical principles accepted at the time, as illustrated by the patient records of Professor of Surgery at the University of Athens, Theodoros Aretaios, which reveal a reliance on adult surgical methods even in cases involving young children. We should also have in mind that in Greek medical literature of the 19th century, the first Greek textbook on pediatrics appeared only in 1871, written by Professor of Pediatrics at the University of Athens, Antonios Vitsaris (1820–1882), in which only sporadically one can find references to pediatric surgery, such as pediatric hydrocephalus which also was performed by

general surgeons. Nevertheless, this book marked an important, albeit sporadic, acknowledgment of pediatric conditions, setting the stage for future specialization (Vitsaris, 1871). Thus, in 19th-century Greece, pediatric surgery was essentially an extension of general surgical practice, lacking the specialization and nuanced understanding that characterize the field today.

Figure 1. Theodoros Aretaios (1829–1893), Tsoucalas & Sgantzos, 2016.

Professor of Surgery at the University of Athens, Theodoros Aretaios (1829–1893) (Fig. 1) is the most important figure in Greek Surgery during the 19th century. He studied medicine at the University of Athens at the beginning, and finished his studies in Berlin. He also continued his medical education in Paris while traveling throughout Europe for educational purposes during his Professorship. His reputation as a surgeon was so great that patients from the Balkans and the Eastern Mediterranean traveled to Athens to be operated on by him. He performed the greatest number of operations, surpassing all other Greek surgeons of his time, and trained many of them (Spyridon, 1896).

In addition, he created the most extensive and detailed patient archive, which has survived to the present day and is now housed in the Manuscripts Department of the National Library of Greece.

Materials and Methods

It is very difficult to find original information regarding pediatric surgery in Greece during the 19th century because there is a great lack of original medical archives on the subject. Fragmentary references to the trauma of children's limbs and heads are found in the medical diaries of practical physicians, such as Elias Giatrakos (19th century), and sporadically in medical periodicals, mainly at the end of the century (Laios–Strantzalis, 2025). This reality does not allow for a systematic view of the theme, but rather a presentation of the most accurate cases described.

Our method was to find the pediatric surgery performed by Aretaios and described in its archive, because they reflect how the Greek surgical community of the time managed a child as a surgical patient. Aretaios and the other Greek physicians of the time followed the rules of pediatric surgery as they were established in Europe at the time. Because Aretaios was the paradigm for the other Greek physicians, we can infer that his work on pediatric surgery was the basic step for the rest of the Greek surgeons in the years that followed. In addition, we should have in mind that Aretaios, like the rest of the Greek physicians, also, in the cases regarding pediatric surgery, followed the principles of the European surgical community of the time, because the majority of the Greek surgeons then had been educated in the famous European University Hospitals, mainly in France and Germany. Therefore, they implemented the European operating strategies in pediatric surgery, even if these strategies at the time were more accurate for adults (Touloukian, 1995).

A 22-day-old infant with rectal atresia

These observations are particularly evident in the patient records of Theodoros Aretaios, who is considered the Greek master of 19th-century surgery. Among these records, one case directly related to pediatric surgery involves a 22-day-old infant with ring rectal atresia in 1879. Rectal atresia is a congenital birth defect in which a normal anal opening is present, but the rectum is completely blocked or contains a narrowed segment a few centimeters above the anus. It is a form of anorectal malformation in which the atresia is confined to the rectum, distinguishing it from imperforate anus, where the anal opening is absent. Symptoms in newborns include abdominal distention, failure to pass meconium, and vomiting. The infant was operated on by Theodoros Aretaios (Aretaios Manuscript, EBE 1879: sheet 416). It is noted that the mother of the female infant discovered on the second day after birth that the baby had not defecated; moreover, from the third

day onward, she expelled fecal material from the vagina while the baby's urine remained clear. The surgeon examined the infant and, through digital examination corroborated by the use of a dilator, confirmed that the child was born with a condition in which the rectum opened into a fistula present in the vagina. The proximal rectum was patent, whereas the distal segment was atretic; consequently, the patient expelled feces through the vagina. This pathological anatomical disorder was also depicted in a relevant diagram included in his report on the case.

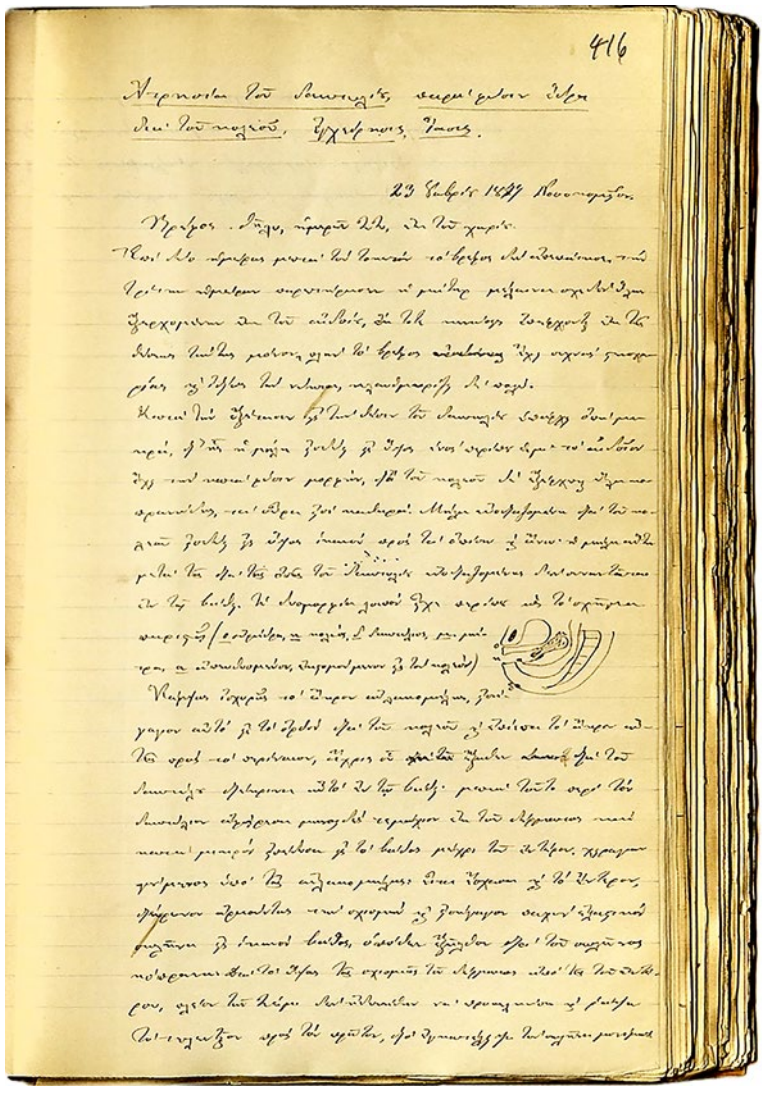

Figure 2. National Library of Greece, Manuscript Number: EBE 1879: sheet 416 with the Theodoros Aretaios sketch of the operation.

To address this condition, Theodoros Aretaios created a passage from the vaginal opening that traversed the entire rectal lumen and exited through an incision that he had made earlier at the anatomical site of the atresia on the distal rectal stump. In this way, he created a conduit for the fecal material, circumventing the vagina. Through this surgically created fistula, he placed a thick elastic tube to redirect fecal discharge to the anatomical position of the rectum. The records indicate that three months after the operation, there was healing at the vaginal opening of the atresia; however, communication with the vagina remained. Therefore, he instructed that the elastic tube be removed and periodic insertions of thick gauze be performed, possibly from the created fistula. However, this is not further specified. No further information is available in the report regarding this case's progress (Fig.2). This surgical approach was similar to that used at the time for rectovaginal fistulas in adults, despite its anatomical and physiological implications.

It should be noted that both the depiction of anatomy and the surgical approach resemble how surgeons managed fistula cases in adult women. Meaning that the newborn was treated like an adult woman who presented a vaginal – rectal fistula, and the technique was an imposed one by the condition performed at the time for adults. Unfortunately, no further follow-up data is available regarding the outcome or possible infection. There is also no mention of genetic anomalies; only the term "malformation" is used as it was used broadly at the time to describe such conditions, and no details are provided regarding other similar cases that may have been handled by this surgeon, who treated this one based on his direct observation and reported in detail his intraoperative findings. His technique is reported only once in his archive, which has survived to the present day, and no other Greek physicians of the time report similar cases.

Four-month-old infant with parotid cavernous hemangioma

The records will also include another operation involving a four-month-old infant in 1884 (Aretaios' Manuscript, EBE 1878: sheet 19). In this male infant, a cavernous hemangioma (also known as cavernous angioma, venous malformation, or cavernoma) was diagnosed in the left parotid region. It is a type of venous malformation resulting from endothelial dysmorphogenesis and is present at birth. After birth, his parents noticed three discolored areas in the left parotid region, which rapidly developed into a voluminous tumor extending from the level of the mastoid process to below the jawline. Upon palpation, Theodoros Aretaios found soft areas and others of rigid consistency; due to its reddish-blue color, he diagnosed a hemangioma. He performed a circumferential excision of the mass.

In areas that were pliable, he sharply dissected with a knife. Scissors were also used for surgical preparation. In solid tumor parts, where he assumed bleeding risk would be higher, he proceeded with meticulous ligation using two ties, after first grasping that part of the mass with Pean forceps, as he specifically notes in his report. The ligated tumor segments were left in situ after ligation.

Instead of using sutures for wound closure, he applied antiseptic dressings directly. After four days, the remaining tumor underwent necrosis following ligation and was manually removed during wound care. This allowed secondary healing of the surgical wound to begin. His report includes a diagram depicting both the incision and the extent of mass removal, as well as surgical boundaries; however, the image appears to resemble an adolescent head rather than that of an infant. This fact, combined with the timing of the intervention, confirms the perception that managing an infant case is similar to managing an adult patient. His method reflects common practice at the time, because it was believed that the ligation of the tumor could allow for better healing on a second approach, avoiding massive hemorrhage.

Sarcoma management in pediatric patients

Sarcomas occurring in childhood, particularly during adolescence, would have been of significant concern to Theodoros Aretaios, given the complex and critical decisions required for their management. This is evident in his documentation, which highlights both the clinical complexities and the social dimensions of surgical treatment in children undergoing debilitating surgeries while facing life-threatening forms of cancer.

In 1882, Theodoros Aretaios encountered a case involving sarcoma developing from anatomical structures in an eight-year-old boy's right axilla (Aretaios' Manuscript, EBE 1879: sheet 303). The records indicate that, following a blow from a fist—a vague history provided by his father—a swelling approximately the size of an egg was observed and initially attributed to blunt trauma. However, it is recorded that pain from this trauma likely prompted the discovery of this mass rather than being its cause.

Since then, this mass rapidly increased in size, prompting his father to consult a local physician who attempted aspiration with a needle but yielded only drops of blood. He then immediately referred the patient to consult Theodoros Aretaios. Upon examining the child, Theodoros Aretaios found a mass measuring about the child's head protruding from the underarm area extending upwards towards the shoulder and ipsilateral clavicle, while causing significant cranial displacement of

the locoregional anatomic structures. In addition, they were medially dislocated towards the right sternal border; caudally up to the seventh rib; and dorsally towards the anterior edge of the scapula, which was also subluxated.

The child appeared thin and severely emaciated—a sign we might today recognize as cancer cachexia. The surface of the aforementioned mass was smooth and spherical, without any fluctuations. A diagnosis of myeloid sarcoma or round cell sarcoma adjacent to the subclavian vessels and brachial plexus was made. The terminology reflects historical classifications. Local cardinal vessel invasion was clinically excluded, since upon inspecting brachial and radial arterial pulses, these were found to be equivalent. The limitations of clinical examination in detecting microscopic infiltration were the main reason for reaching this conclusion. Intact vessel status was specifically noted in Aretaios´ records. The lack of chemotherapy or radiotherapy at the time made radical surgery the only approach.

Aretaios stated: "I considered removing this tumor as likely feasible; thus, I proceeded today with this arduous and difficult operation, hoping that, if successful, it might free the young patient from tumor recurrence, especially given the rapidity with which it could destroy local tissues and disseminate." However, after making two incisions from the clavicle laterally towards the arm and dissecting soft tissues, Aretaios came across an unfortunate intraoperative finding. He discovered that the tumor infiltrated the brachial plexus as well as the brachial artery and vein. Only debulking the tumor by excising non-infiltrative tumor portions would mean leaving tumor remnants behind.

At this point, he faced a tremendous intraoperative quandary: Should he complete the operation, leaving remnants behind that would surely lead to recurrence and death? Or should he remove the entire tumor, risking vascular compromise leading to gangrene, which could result in death? He instead decided to attempt giving this young patient a chance at life by disarticulating and amputating the upper limb after first ligating the vessels at the clavicular level, which was, at the time, the most common approach.

He ultimately closed the surgical wound using flaps from the deltoid muscle area. Although the operation lasted 45 minutes, the young patient initially struggled with chloroform anesthesia. After induction, the boys' pulse significantly dropped, necessitating a pause in its use. Chloroform was only reapplied when the patient cried out during the procedure, and notably, it was not used at all during the suturing phase due to his continuous cries of pain.

Upon completion, the child appeared exhausted, nearly insensible; his pulse was very weak; his breathing was shallow, signaling cardiorespiratory distress.

Theodoros Aretaios initially administered wine and restorative drinks without effect. He then resorted to subcutaneous ether injection again without success, leading him finally to artificial respiration employing alternating compressions over the epigastrium, yielding improvement only during application.

Ultimately, he resorted to electricity, applying one pole to the scalene muscle and the other to the precordial area, which temporarily improved the pulse and respiration for about fifteen minutes. However, the young patient ultimately died. The surgeon concluded that the cause of death was neither chloroform nor blood loss during the procedure—estimated at no more than five or six ounces—but rather from nervous shock induced by the operation. Aretaios believed that, having in mind that a severe operation was performed on a little boy, his nervous system broke down. From an ethical point of view, this radical operation could have had a tremendous impact on the social life of a child, and, if the patient survived, on the life of an adult man at that time.

The patient from Aydin

Theodoros Aretaios would again find himself in a dilemma in 1886 when he was called to manage the case of a 14-year-old girl from Aydin who presented with osteosarcoma of the lower jaw (Aretaios' Manuscript, EBE 187: sheet 408). According to her mother's account, the girl had developed a small initial swelling in the alveolar region of her lower incisors at the age of eight, which progressively increased in size until it protruded from her mouth and bled recurrently. When she arrived seeking Aretaios´ help, he described encountering a patient in a dire condition: pale, with paper-thin skin due to emaciation from bleeding anemia—what we might today recognize as cancer cachexia—and presenting with a large mass. Her mouth was deformed, taking on a shape with an opening three times the normal size; her lower jaw teeth were outwardly displaced, and the mass itself protruded caudally, resembling a small melon, with an irregular lobular shape. Localized bleeding was present.

The surgeon assessed that the patient's current state was extremely severe; her weakness did not allow for immediate surgery, as she would neither withstand anesthesia with chloroform nor the extent of the operation. Therefore, he decided to keep her in the clinic to try to improve her preoperative status and nourish her body while also conservatively managing the bleeding. He managed to achieve a slight recovery to some extent for two months. At the end of the second month, the tumor began to liquefy and necrose in places, causing significant bleeding. For these reasons, the dilemma returned for the surgeon: should he wait for her

general health condition to improve at the risk of death from bleeding, or proceed immediately to surgery again with the risk of death from her extensive emaciation that would not allow her to cope with the severity of the operation?

Due to the patient's critical condition, he decided to go ahead with surgery, as it was assumed to be the only causal solution that could offer hope for survival. We should have in mind that some techniques or terminology may differ from modern standards. First, he excised the two adjacent teeth near the tumor and then divided both sides of the jawbone using strong scissors. He tilted the body of the tumor downwards and severed it from its margins with respect to both the tongue and floor of the oral cavity. He took great care to grasp large local vessels with hemostatic forceps to avoid intraoperative bleeding and operative field distortion. He then prepared the surrounding soft tissues and examined the tumor in its entirety. The excess tissue created by skin distension due to the tumor—which gave an impression of a sack—was excised through a hyoid incision. He sutured the wound edges after first placing a drainage tube at the margins of the mandibular resection and filled the traumatic cavity with iodinated gauze to reduce the incumbent dead space. He emphasized that the operation was almost bloodless, believing that not even an ounce of blood was lost. Postoperatively, the young patient was supported with liquids administered via a nasogastric tube. On the fifth postoperative day, he removed the iodinated gauze and sutured the wound using delayed primary closure, reflecting the practice of the time.

Postoperatively, the young girl developed a high fever that was not linked to the surgical wound and was managed conservatively. Additionally, the patient experienced minor dysphagia. Ultimately, one month post-surgery, she was discharged at her parents' request while still exhibiting signs of emaciation and weakness. She was recorded as cured; however, no further information on her health progression is available in the archival records, and follow-up data are limited.

13-year-old patient with palantine sarcoma

Coming from Asia Minor—specifically from Cydonia (Ayvalik)—a 13-year-old patient with palatine sarcoma, a diagnosis based on clinical impression documented in the records, while histopathological confirmation was likely unavailable or limited at that time (Aretaios' Manuscript, EBE 1879: sheet 467), also consulted Theodoros Aretaios in 1883. The case was managed by Dr. Dimitrios Tr. Tambaopoulos, who signed off on the report. Four months prior, this patient noticed a soft swelling in his palate, about the size of a walnut, which progressively increased in volume, provoking difficulties with swallowing and breathing as it extended

into his left nasal cavity. The patient, therefore, presented symptoms of dyspnea and suffocation at night. During examination, the anterior cervical lymph nodes were found swollen.

The tumor was surgically excised via an intraoral approach using scissors and a surgical knife. The type of anesthesia is not documented. Symptoms ceased immediately, especially nighttime suffocation. Since not all the tumor was removed during this initial procedure, three other minor surgeries followed—two curettages and one small excision of remaining tumor tissue—so that ultimately, he was considered cured and in good condition according to the surgeon's assessment.

13-year-old patient with myeloid sarcoma of the left orbital cavity

Myeloid sarcoma in a pediatric patient is again encountered in Theodoros Aretaios's records from 1890, involving a 13-year-old girl described as suffering from myeloid sarcoma of the left orbital cavity (Aretaios' Manuscript, EBE 1880: sheet 223), which, based on the clinical symptoms, was believed at the time to be a type of malignancy. Although ophthalmological cases were already being treated by ophthalmologists at that time, similar cases were still referred for surgical treatment; even then, as specialization in ophthalmology became more clearly defined, surgeons were not entirely excluded from treating these patients. Thus, similar cases—primarily involving adults—are also found within this clinic's records.

Nevertheless, when her parents noticed an abnormal growth on her left eye, specifically on her upper eyelid, they sought help from Theodoros Aretaios. Upon clinical examination, he noted the exophthalmos of her left globe tilted downward, and an upper eyelid turned upward. Palpation revealed a mass about the size of a walnut at the inner upper corner of her left orbit; it was immobile upon palpation, with its inner, lower, and outer parts surrounded by soft tissue. The conjunctiva of her eyelid appeared reddened, with numerous aneurysmally dilated vessels. Her vision reportedly remained unaffected.

The records indicate that Dr. Panopoulos examined her using an ophthalmoscope; he seemed to be an ophthalmologist at the hospital. During fundoscopy, it was found that her optic nerve appeared "compressed," indicating edema of the optic disc, while many aneurysmal vessels were present on her retina. The patient did not report headaches or any pathological elements in her nasal cavity.

Theodoros Aretaios arrived at a diagnosis of myeloid sarcoma surrounded by myxomatous tissue. He determined that the bulbus oculi was not involved in the process, which is why he proceeded with the excision of the tumor by transversely

dividing the upper eyelid. The excised walnut-sized tumor macroscopically presented four lobes connected by a long, thick stalk. The area beneath the eyelid was firm, while the remaining surface was soft.

Records point to suspicion of minor infiltration of the surgical wound, despite uneventful healing. The question of whether this was a recurrence or a local reaction to the surgical scar arose on the 10th postoperative day. According to Aretaios, it would eventually become clear from the progression of this condition over the following days. The patient was discharged on the 20th postoperative day after unproblematic healing.

One and a half months after discharge, the patient returned with a local recurrence of the tumor. The surgeon attempted to excise it, but did not describe the timing of the procedure in the records; it would later be found that the tumor had infiltrated internally into the orbit and had now invaded brain tissue. There is no record of any attempt at excision, but it is noted that eight days later, the patient passed away due to encephalitis. The limited information in the medical records did not allow us to obtain a systematic, detailed view of the patient's clinical condition or histopathological documentation.

Fistula management

Another surgical pathology for which pediatric surgical intervention was performed at Theodoros Aretaios' clinic involved the management of fistulas. In 1873, a 15-year-old patient presented with a 12cm long fistula extending from her umbilicus that exited in the left hypochondrium (Aretaios' Manuscript, EBE 1873: sheet 39). Unfortunately, no further information is recorded about the history or cause of the fistula. If it was not the result of trauma, we might speculate—given her age—that it represented a manifestation of inflammatory bowel disease, particularly Crohn's disease, although this remains a conjectural diagnosis. The only recorded intervention was the placement of a perforated rubber tube to manage the fistula. However, no further information regarding her clinical progress is available.

In 1881, a 9-year-old patient presented with a cervical (noted in records as brachial) tumor in the middle of his neck because of a ruptured brachial cyst (Aretaios' Manuscript, EBE 1878: sheet 54). The duct had formed at the level of the cricoid cartilage and ended at the hyoid bone. Theodoros Aretaios used a probe to locate the course of the fistula and then proceeded to excise it. The documentation lacks technical specifics. The patient had an uneventful postoperative course.

Conclusion

In summary, the surgical practices of Theodoros Aretaios in the 19th century highlight the complexities and challenges of pediatric surgery during this period. It is important to remember that archival documents provide limited, sometimes fragmentary, information, and that interpretations or conjectures are made within those constraints. His cases, including a 22-day-old infant with atresia and a 14-year-old girl with osteosarcoma, illustrate the lack of specialization in pediatric surgery and the reliance on adult surgical techniques, often leading to difficult decisions regarding patient care. Aretaios's experiences reveal not only the medical challenges but also the social implications of treating life-threatening conditions in children, emphasizing the evolution of surgical practices and the need for a more child-centered approach in modern medicine. This historical examination serves to inform contemporary understanding of pediatric surgical care and its development over time.

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Contributions

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Conflict of interest

The authors declare no potential conflict of interest.

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SAŽETAK

Povijesni pregled dječje kirurgije tijekom 19. stoljeća, posebno preko slučajeva koje je vodio Theodoros Aretaios (1829. – 1893.), ističe složenost i izazove s kojima su se suočavali kirurzi toga doba. Aretaiosova iskustva u liječenju stanja poput atrezije i osteosarkoma otkrivaju nedostatak specijalizacije u dječjoj kirurgiji, s obzirom na to da su se primjenjivali postupci u liječenju odraslih, bez potpunog rješavanja specifičnih potreba djece. Njegova dokumentacija ne ističe samo medicinske izazove, već i društvene implikacije liječenja smrtonosnih bolesti kod mladih pacijenata, naglašavajući razvoj kirurške prakse te nužnost primjene pristupa usmjerenog na dijete u suvremenoj medicini. Ovaj članak nastoji osvijetliti razvoj dječje kirurške skrbi, ilustrirajući kako povijesne prakse utječu na suvremena shvaćanja i metodologije.

Ključne riječi: *dječja kirurgija, Theodoros Aretaios, 19. stoljeće, grčka kirurgija*