



Historical role of roentgen irradiation in the treatment of pilonidal sinus

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Abstract

Pilonidal sinus, a condition characterized by painful abscesses or cysts in the sacrococcygeal region, has troubled humanity for centuries. The history of its treatment is a testament to the evolving medical knowledge and practices over time. One intriguing chapter in this history is the historical role of irradiation in the treatment of pilonidal sinus. This article explores how irradiation was once considered a viable therapeutic option, its historical context, the scientific reasoning behind its use, and the consecutive shift away from this approach propelled by the emergence of side effects and the advent of more efficacious treatments.

Keywords

Pilonidal Sinus · Depilation · Irradiation · Radiation, ionizing · Radiotherapy · Radiography · Recurrence · Fistula

Pilonidal sinus, often wrongly referred to as “Jeep’s disease” due to its allegedly higher prevalence among soldiers during World War II [2, 3], is a relatively common but painful condition with increasing incidence worldwide [4, 5]. It is characterized by the formation of abscesses, cysts, or sinuses in the sacrococcygeal region in the upper third of the intergluteal fold. The etiology of pilonidal sinus is complex and multifactorial, involving factors such as penetration of sharp head hair fragments [6] into the healthy skin [7]. A sometimes raised occurrence in certain families can be observed [8]. Throughout history, various treatment modalities have been explored to alleviate the suffering of individuals afflicted with this condition.

One intriguing but largely forgotten aspect of pilonidal sinus treatment is the historical role of irradiation, specifically X-ray

therapy. In the early to mid-20th century, X-ray irradiation was considered a promising approach to manage pilonidal sinus. This essay aims to shed light on this historical treatment method, elucidating its context, scientific rationale, and eventual decline as more effective treatments emerged.

Historical context

To understand the historical use of irradiation in pilonidal sinus therapy, it is essential to consider the broader historical context of medicine and radiation during the early 20th century. The discovery of X-rays by Wilhelm Conrad Roentgen in 1895 ushered in a new era of medicine [9]. Radiography became a revolutionary diagnostic tool, allowing physicians to visualize internal structures without inva-



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sive procedures. Just months following Roentgen's discovery, the first irradiation treatments were applied. Simultaneously, the therapeutic potential of radiation was explored. Radiologists and physicians began experimenting with X-ray and radium therapy for various conditions, believing in the healing powers of ionizing radiation. This era saw the application of radiation in the treatment of conditions such as tuberculosis, skin diseases, and even cancer.

The fascination with radiation's therapeutic potential coincided with World War I and World War II, during which pilonidal sinus became a significant concern among soldiers [10]. This period marked the emergence of irradiation as a potential treatment option for pilonidal sinus, driven by a combination of necessity and scientific curiosity.

Scientific rationale for irradiation in pilonidal sinus treatment

The scientific rationale behind using irradiation to treat pilonidal sinus was multifaceted and reflected the limited understanding of the condition at the time.

- Bacterial control: Radiologists and physicians believed that ionizing radiation could effectively kill or inhibit the growth of bacteria responsible for the infection in pilonidal sinus. The sterilizing effect of X-rays was well known, and it was thought that irradiation could eliminate the source of infection within the sinus tracts [11].
- Reduction of hair growth: Pilonidal sinus often involves the ingress of hair into the sinus cavities, which can lead to inflammation and infection. Early 20th century medical practitioners theorized that irradiation could inhibit hair growth in the affected area, preventing the recurrence of pilonidal sinus. It was Leopold Freud in 1896 who used roentgen rays over 4 weeks for depilation in a 5-year-old girl with a "naevus papillosus piliferus" (hairy nevus), irradiating the neck, back, and scapular area in total [12]. Nevertheless, shortly after, he reported a marked erythema within the area irradiated [13]. The first book about the therapeutic value of X-rays was published 1898 by Ward [14].

- Promotion of tissue healing: Radiation therapy was believed to stimulate tissue healing and repair. It was thought that irradiation could promote the closure of sinus tracts and abscesses, thereby providing relief to patients. Tissue recovery and decreased recurrence rate were suggested by Sher in 1944 [15].
- Pain relief: Pain is a significant symptom of pilonidal sinus, and irradiation was expected to alleviate pain by reducing inflammation and infection, which was also used by Voigt in a nasopharyngeal cancer patient in early 1986 [16].
- Noninvasiveness: One advantage of irradiation therapy was its noninvasive nature. Unlike surgical procedures, which were often associated with long recoveries and potential complications, irradiation could be administered externally, making it an attractive option for both patients and physicians [17].

Historical application of irradiation in pilonidal sinus treatment

During the early 20th century, X-ray therapy was administered to individuals with pilonidal sinus in several clinical settings. The approach varied, but it generally involved the following steps:

- Diagnosis: Physicians would diagnose pilonidal sinus based on clinical examination and symptoms, such as pain, swelling, and drainage from the sinus tracts. Contrast media were inserted into the tracts and plain pelvic X-rays were taken to estimate the length and orientation of the fistula tract system.
- Radiation treatment planning: Once diagnosed, patients would be referred to X-ray-applying persons for treatment planning; in early times, this was not always a doctor. Treatment involved the determination of an "appropriate" dose of X-ray radiation and the duration of treatment, which was highly experimental at the beginning (trial and error) [18–20].
- Radiation sessions: Patients would then undergo a series of X-ray sessions, typically administered daily or several times a week. Total doses ranged be-

tween 250 and 825 Rad [18]. The X-ray tube would be adjusted to target the affected area, and the radiation would be delivered externally. Dosimetry was linked to skin reddening (skin erythema dose), as precise measurements were not available. Blocking out areas that should go unirradiated was not yet invented. Unwanted eyebrow and facial depilation in combination with skin changes and radiation blisters on the right hand were reported by radiation personnel [21]. As the person changed hands, similar changes appeared on the left hand.

- Monitoring and follow-up: Patients were monitored, and their response to irradiation was observed. Short-term results prevailed, while long-term sequelae had not yet been discovered.

In the first half of the 20th century, radiation was recommended and used preoperatively for depilation, infection reduction, and "stimulation" of the wound [15, 22]. Patey and Scarff, two heavyweights in pilonidal sinus treatment at the time, recommended preoperative X-ray treatment as routine for pilonidal sinus [23].

Turell even considered irradiation as a substitute for surgery [18]. He recommended it postoperatively as well, if tracts had been incompletely removed [24] (referring to the high recurrence rate at that time, which was thought to be due to tract remnants). Postoperative roentgen therapy was applied to large cohorts of patients in the forties and fifties. Bellis reported this treatment in $n=315$ patients, where postoperative irradiation led to complete healing of marsupialization wounds within 2 weeks [25].

Postoperative wound depilation was considered especially advantageous in hairy patients, where 500 Rad were locally applied [26]. Two years later, in 1955, the same author—Swinton—changed his mind and recommended using other methods of depilation than irradiation, acknowledging that certain dangers could be associated with the use of Roentgen rays—60 years after Conrad Wilhelm Roentgen had discovered them [27].

The decline of irradiation in pilonidal sinus treatment

Despite the initial optimism surrounding irradiation therapy for pilonidal sinus, it eventually fell out of favor for several reasons—one was the limited efficacy: over time, it became clear that irradiation therapy did not consistently achieve the desired outcomes. While some patients experienced temporary relief, recurrence rates remained high. The sterilizing effect of radiation on bacteria was often insufficient to prevent reinfection. Information further emerged en masse that long-term risks of radiation therapy were immanent. Ionizing radiation carries the risk of local and deep tissue damage, radiation burns, lymphatic and bone marrow suppression, and an increased risk of radiation-induced neoplasia. The potential for these adverse effects raised questions about the overall safety of irradiation as a treatment for benign conditions like pilonidal sinus.

Surgical approaches, such as excision and primary wound closure, became more refined and effective in the treatment of pilonidal sinus. Beforehand, infectious complications were widespread, but with the beginning of the antibiotic era, lower infection and higher wound closure rates were achieved.

In parallel, there was an increased understanding of pilonidal sinus: the condition was more complex than initially thought, involving multiple factors such as hair penetration, genetics, and local anatomy. This nuanced understanding prompted a shift away from radiation to new fields of research. Ethical and legal concerns sped up this development away from irradiation treatment: patients and healthcare providers began to question the appropriateness of irradiation for a condition that could be managed effectively through less invasive and safer means.

Modern management of pilonidal sinus

In the contemporary medical landscape, the management of pilonidal sinus has evolved significantly from its historical roots. The decline of irradiation as a treatment option has been accompanied by

the adoption of more evidence-based approaches:

- Surgical techniques: Surgical excision remains the primary treatment for pilonidal sinus. Various surgical techniques, including excision and primary asymmetric closure, small off-midline excision with open healing, and flap procedures are applied based on the extent and severity of the impairment. Surgical interventions have shown improved long-term outcomes and reduced recurrence rates compared to irradiation [28, 29].
- Laser hair removal has gained popularity for aiding managing pilonidal sinus. These techniques target hair removal and seem to be part of the useful portfolio to prevent recurrence [30–32].
- Wound care: Maintaining proper wound care in the sacrococcygeal region is essential in preventing and managing pilonidal sinus [33].
- Split care in acute infection: In cases of acute infection, paramedian abscess drainage is mandatory for definitive surgical care to follow when the acute infection has subsided. This has the potential to reduce recurrence rates, as has been found [34].
- Patient education: Patients are educated about the importance of hair fragment removal and lifestyle modifications to prevent pilonidal sinus recurrence [35]. This patient-centered approach is crucial in modern management. Pilonidal sinus treatment in children has to be understood as different from adult therapy [33].
- Research and innovation: Ongoing research seeks to better understand the pathogenesis of pilonidal sinus and explore novel treatment modalities, especially anatomy as well as hair and skin interactions. Advances in wound healing as well as primary and recurrence prevention continue to shape the landscape of pilonidal sinus management.

Conclusion

The historical role of irradiation in the treatment of pilonidal sinus provides a fascinating glimpse into the evolution of medical knowledge and practices. In the early to

mid-20th century, X-ray therapy was seen as a promising approach to address this painful condition. However, as our understanding of pilonidal sinus deepened, the limitations and risks associated with irradiation became apparent. Modern medicine has since moved away from irradiation as a treatment option for pilonidal sinus, now favoring surgical techniques, minimally invasive procedures, and patient education. The decline of irradiation in pilonidal sinus treatment serves as a reminder of the dynamic nature of medical progress and the importance of evidence-based practices in patient care.

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Historische Bedeutung der Röntgenbestrahlung in der Behandlung des Pilonidalsinus

Der Pilonidalsinus, eine Erkrankung, die durch schmerzhafte, rezidivierende Abszesse oder Zysten in der Sakrokokzygealregion gekennzeichnet ist, plagt die Menschheit seit Jahrhunderten. Die Geschichte seiner Behandlung ist ein Zeugnis der Entwicklung des medizinischen Wissens und praktischer Anwendungen im Laufe der Zeit. Ein spannendes Kapitel dieser Geschichte bildet die historische Bedeutung der Röntgenbestrahlung in der Behandlung des Pilonidalsinus. Im vorliegenden Beitrag wird untersucht, wie einst die Bestrahlung als eine gangbare therapeutische Option betrachtet wurde, ihr historischer Kontext, die wissenschaftliche Begründung für ihre Anwendung und die anschließende Abkehr von diesem Ansatz, die durch das Auftreten von Nebenwirkungen und die Entstehung wirksamerer Therapien notwendig wurde.

Schlüsselwörter

Pilonidalsinus · Depilation · Epilation · Röntgenbestrahlung · Radiotherapie · Röntgendarstellung · Rezidiv · Fistel

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