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Utility of drains in orthopaedics

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Abstract--Introduction: The use of drains in orthopedic practice has been affected by the concept of evidence-based medicine, which is accepted as the standard of care for all surgical or medical practices. This concept questions all care processes that cannot be backed by evidence to be beneficial to the patient. There have been a large number of multi-center meta-analytical studies that have found drains to be of little or no benefit in trauma and orthopedic surgeries. As a result of these studies, there are few situations where drains are routinely used, such as calcaneal fractures in developed countries. Even major procedures like total knee and arthroplasties are being performed without drains. We aim to investigate whether similar evidence can be found in our practice. Materials and Methods: This sounds like the description of a prospective randomized controlled trial (RCT) studying the use of drains in certain types of surgical procedures. The study population consisted of 86 patients matched for sex and type of injury, and they were assigned to either a group that used drains or a group that did not use drains during their operations. The study aimed to observe and compare the rates of complications, such as haematoma, drain migration, infection, and inadvertent drain stitching, between the two groups. Results: Eighty six major orthopaedic operations were studied. There was no evidence of occurrence of complication arising from non use of drains in the undrained group. Those patients whose wounds were drained had no need for drain change thus making the wound care less eventful. Conclusion: Wound drains can help reduce tissue swelling in the postoperative period, but there is no significant difference in infection rates, haematoma or seroma formation between drained and undrained wounds.

Keywords--drains, drained surgical wounds, undrained surgical wounds.

Introduction

The use of drains in surgical practice can be traced back to the works of Hippocrates, dating back to 450 BC. Over time, there has been a significant amount of experience in the use of drains in general surgery, leading to a clear understanding of when to use or not use them. However, current evidence suggests that there is no significant difference in outcomes for orthopedic surgical wounds that are drained and those that are not. Despite this, orthopedic surgeons may still form personal opinions on the use of drains without evidence-based reasons.[1,2,3]. Opponents of drains in surgery argue that they can lead to bacterial transmigration, drain migration, and pin tract infections, and may increase the cost of the procedure for the patient. Furthermore, the use of drains can also cause distress for patients who may need to return to the operating room for drain removal.[4,5,6]. The duration of drain use has been studied extensively and is considered less controversial. Studies have indicated that drains should not be used for longer than 24 hours. However, a study of orthopedic surgeons in the mid-Trent region of the United Kingdom found that up to 69% of surgeons leave drains in for longer than 24 hours. This study aims to evaluate the effectiveness of drain use in our practice by analyzing parameters such as wound outcomes, drain behaviors, and duration of hospital stay.[7,8,9,10]

Materials and Methods

A study was conducted at VIMS, India over a period of 18 months, between January 2021 and June 2021. The study involved 86 major orthopedic operations, including below knee amputations and exploratory laminectomies for suspected spinal cord tumors. The patients were divided into two groups, with one group receiving a drain and the other group not receiving a drain. The patients were assigned to a group by simple random sampling, and perioperative antibiotics were given to all patients for at least 48 hours. Anti-coagulant chemotherapy was given on a case-by-case basis as needed. The surgical wounds were lavaged with normal saline, and the volume of fluid collected was measured for patients in the drainage group. The presence of hematomas, dressing soilage, and infections were documented for all patients in both groups. The study used student's t-test and Fisher's test for comparisons between quantitative and categorical variables, respectively. The analysis was done using IBM SPSS Statistics version 20, and statistical significance was considered as P value <0.05.

Results

An orthopedic and musculoskeletal trauma study was conducted on 86 major operations. The study included 58 males and 28 females with an age range of 15 to 75. The average age for males was 48, while the average age for females was 60. Results of the study showed that out of the 20 hip excision arthroplasties with tube drainage, two had collections of hematoma that required evacuation due to significant postoperative bleeding. In contrast, none of the 10 patients who did not have tube drainage had hematoma collection, despite significant soilage of dressings and bedsheet soiling that required changes.

The study also found that three out of 20 Kuntscher nailings for femoral fractures had superficial wound infections, with two of them occurring in the same individual who had bilateral Kuntscher nailing at a fortnight's interval, and the third patient was operated on the same day. These three patients belonged to the undrained group. There was no deep wound infection in both the studied groups. One of the patients with ankle reconstruction had early wound dehiscence. However, postoperative swelling was present in all patients who had ankle reconstruction without a drain. None of the patients in this group who had a drain had postoperative swelling.

No complications were reported for patients with universal A.O. nails for tibia and femur. No tourniquet was used in any of the patients. All intramedullary nails were inserted by the open method. No difference in intraoperative bleeding between the two groups was observed. The same result was noted in the amputation subgroup. None of the patients had a drain inadvertently stitched to the tissues. Two external migrations of the drain were seen in two femoral Kuntscher nails, which necessitated changes in dressings. These two patients had a turbulent postoperative period and were observed to have very low pain thresholds despite adequate parenteral narcotic analgesia. Postoperative dressing soilage was universal in occurrence in all patients without drains, requiring changes in dressings in the fourth postoperative hour and a second change 24 hours after surgery.

Discussion

In the past, the use of drains in orthopedic surgery was commonly believed to be necessary to prevent the formation of hematomas. However, until the mid-1970s, there were few randomized controlled clinical trials conducted to support this belief. As a result, the use of drains in orthopedic surgery was largely based on tradition and inconclusive data from retrospective studies. More recent controlled trials have called into question the need for drain use in major orthopedic operations. Hematomas can lead to an increase in bacterial growth, as well as impede wound healing due to increased tissue tension and reduced blood flow.[4,5].

In our study, we found that none of the wounds that were drained had any issues with dressing soilage, while all of the undrained wounds required at least one change of dressing, with an average of two changes. Additionally, we observed that six to ten standard size pieces of gauze were soiled in the undrained group. One patient who had anti-coagulation for a hemi-arthroplasty and had a tube drain in place continued to drain for a week. The persistent bleeding from the drain was attributed to an abnormal response to the anti-coagulant Clexane. [6] However, our institutional protocol is to commence anti-coagulation a day before surgery and to continue for seven days after surgery or longer if the patient requires. [7] Two patients with drained wounds had tube blockage leading to hematoma collection, accounting for 0.01 percent of drained patients. None of the undrained patients developed hematomas, probably because of the egress to the dressings as soilage.[8,9] Skin closure was done in two layers in the femur and in a single layer in the leg with interrupted sutures. Three cases of superficial infection were documented in the undrained surgical group, giving an infection

rate of 0.07% compared to none in the drained group. The source of the infection could not be identified, even though the three patients were operated on the same day. It is possible that the infection was introduced during the process of dressing change or as a result of a breakdown in theater aseptic techniques. In a study of 529 knee arthroplasties treated with or without drains followed-up for six months, the incidence of superficial wound infection was found to be 2.9% and 4.8%, respectively. The incidence of deep infection was 1.2% and 0.4%, respectively. There was no difference in the duration of hospital stay between drained and undrained wounds, with the average number of days spent being fourteen. The range was fourteen to twenty days.[10]

In our study, we did not observe any cases of wound dehiscence among our patients. Additionally, there were no incidents of deep vein thrombosis reported in both the group that received drains and the group that did not. However, we did note two instances of hematoma collection and five instances of dressing soilage in patients who underwent above knee and below knee amputations and received drains. This is not in line with what we observed in the drained groups and may have been caused by poor control of bleeding during the operation, surgical technique, or noncompliance with anti-coagulation therapy.[11]. In a study of five patients who underwent undrained bimalleolar ankle reconstruction, postoperative swelling was observed in all patients. To reduce the risk of significant ankle swelling, the use of vacuum drain with Jones dressing and limb elevation is recommended. None of the patients who underwent drained bimalleolar ankle reconstruction had significant swelling. These swellings may be caused by high pressure in the tight osteofacial compartments around the ankle, which is made worse by accumulating hematoma.

Two patients in a study experienced external drain migration following surgery for femoral fractures using Kunstcher nails. Both patients reported low pain thresholds and restlessness during their postoperative recovery. This small complication adds to the burden of self-procured healthcare for patients without insurance or strong family support. The study followed patients until discharge from the hospital and may have resulted in underreporting of complications related to drain usage. However, other studies have found no significant differences in reoperation rates, limb swelling, deep vein thrombosis, range of movement, or time to return to work between patients who had drains and those who did not. Clinical and laboratory evidence suggests that bacteria can migrate through tubes and potentially enter the wound through other means. No patients in this study were sent home with a drain.[12]

Drains are a well-known tool used in medical procedures, but they can also compromise the patient's defense against infection. They are often placed near sensitive areas such as neurovascular bundles or anastomotic sites. However, if drains are not properly secured or left in place for too long, they can lead to complications such as dislodgement or retrograde drainage into the wound. These issues can be considered misuse or abuse of the drains. It is important to note that their use should be evaluated on a case-by-case basis, particularly in procedures involving skin grafts or chronic osteomyelitis. Additionally, if proper intra-operative hemostasis and tissue handling protocols are followed, the use of

drains may not be necessary. The use of drains should not be relied upon as a means to compensate for improper techniques.[13]

Conclusion

In summary, the use of surgical drains in orthopedic surgery does not have a significant impact on overall surgical outcomes, but they may be recommended for aesthetic reasons and to reduce the number of dressing changes and pressure around tight osteofacial compartments.

Informed Consent

Written informed consent was taken from patients.

Ethical Approval

Ethical committee approval was taken from the Institutional Committee Of Ethics, VIMS (VIMSE/2022/11-89).

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Conflict of Interest

There was no conflict of interest

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