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Should Surgical Drains Be Used After Routine Primary Total Knee or Total Hip Arthroplasty?

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Response/Recommendation: The use of surgical drains in routine primary total knee and total hip arthroplasty is not recommended.

Level of evidence: High.

Expert Voting: Agree 83.52%, Disagree 12.91%, Abstain 3.59%.

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Expert Voting: Agree 83.5%, Disagree 12.9%, Abstain 3.6%.

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Rationale

Surgical drains have been around since the 1960s and are used with the main purpose of avoiding hematoma in a surgical site. Many orthopaedic surgeons also used surgical drains during the early years of arthroplasty [1]. Again, the main purpose of using surgical drains was to avoid hematoma formation and the potential consequences of hematoma, such as infection. One of the earlier reports on the benefits of surgical drains did indeed demonstrate a lower infection rate when a drain was used [2].

However, in recent decades and with the advancements in surgical and anesthesia techniques, the use of surgical drains has declined [3–5]. In fact, numerous level 1 evidence studies have shown the disadvantages of surgical drains in terms of increased

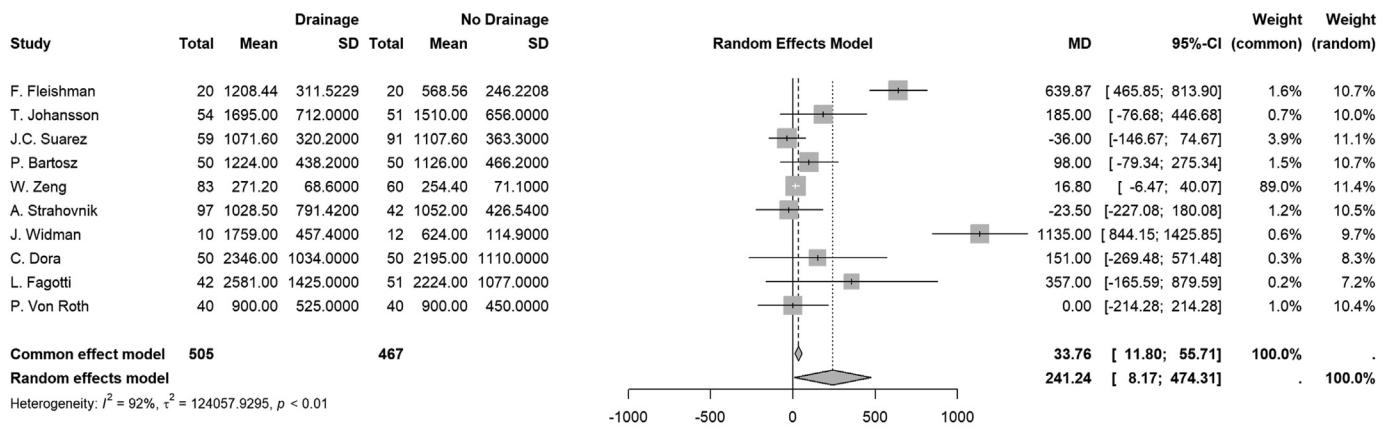


Figure 1. Meta-analysis blood loss after hip arthroplasty.

blood loss, need for allogeneic blood transfusion, and potential for introduction of infection into the surgical site [3–40]. Our search of the literature revealed 38 level 1 evidence studies, in English, related to the use of surgical drains after primary hip and knee arthroplasty. Of those, 24 papers were with patients after primary hip arthroplasty and 20 with primary knee arthroplasty; some studies include both knee and hip arthroplasty. Among these, 31 studies were randomized controlled trials and seven were well-conducted systematic reviews.

Blood loss was the primary outcome in 10 studies related to the hip and six studies related to the knee. Most of the authors used a modified Gross formula to calculate total blood loss, which takes into account the combined intraoperative and hidden blood loss. Of those papers, three studies investigating hip arthroplasty and two studies of knee arthroplasty patients showed increased blood loss in the group with surgical drains [7,27,30,35]. In other papers, there was no statistical difference between groups with or without drain. The same pattern was also observed in the meta-analysis on hip patients [Figure 1]. In the knee arthroplasty cohort, there were no statistically significant differences in blood loss between the groups [Figure 2].

Data on the need for allogeneic blood transfusion was provided in 31 studies. In eight of those studies, differences between groups were shown with the surgical drain cohort needing a higher rate of blood transfusion [6,9,14,16,24,28,29,36] [Figure 3].

Other postoperative complications were also evaluated by many of these studies. The rate of complications, for the most part, was

comparable between the cohorts with and without the use of surgical drains. There was one study, however, that demonstrated a higher rate of reoperations in the surgical drain cohort [35]. In two papers, there were differences in infection rate after surgery. In one study from China, in patients undergoing hip arthroplasty, the authors noted a higher rate of surgical site infection and prolonged wound discharge in patients who did not have surgical drains [17]. In another study by Maliarov et al., the opposite was observed, as patients undergoing total knee arthroplasty in whom surgical drain was used had a higher rate of deep and superficial infections [35]. In six studies, there was a significant difference in the rate of prolonged wound drainage and the need for dressing reinforcement. In five studies, the wound problems occurred with higher frequency in patients who did not have surgical drains, while in another study by Johansson et al. the wound problem was seen more often in patients who had surgical drains [10]. There was one study checking the results of drain use after knee arthroplasty without tourniquet; there were no differences between the analyzed groups [33].

A few studies have also evaluated pain with and without the use of surgical drains. However, the method evaluating this outcome is heterogeneous. It is difficult to glean a concrete conclusion related to pain from these studies. There were three studies that did demonstrate a lower visual analog scale in patients who had a surgical drain, compared to those who did not have one, in patients undergoing total hip arthroplasty. However, two other studies have shown the opposite results.

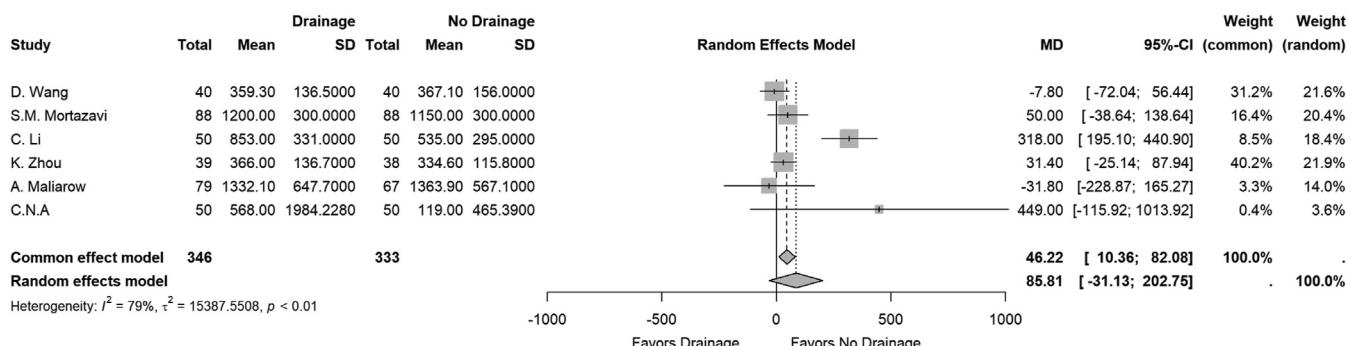


Figure 2. Meta-analysis blood loss after knee arthroplasty.

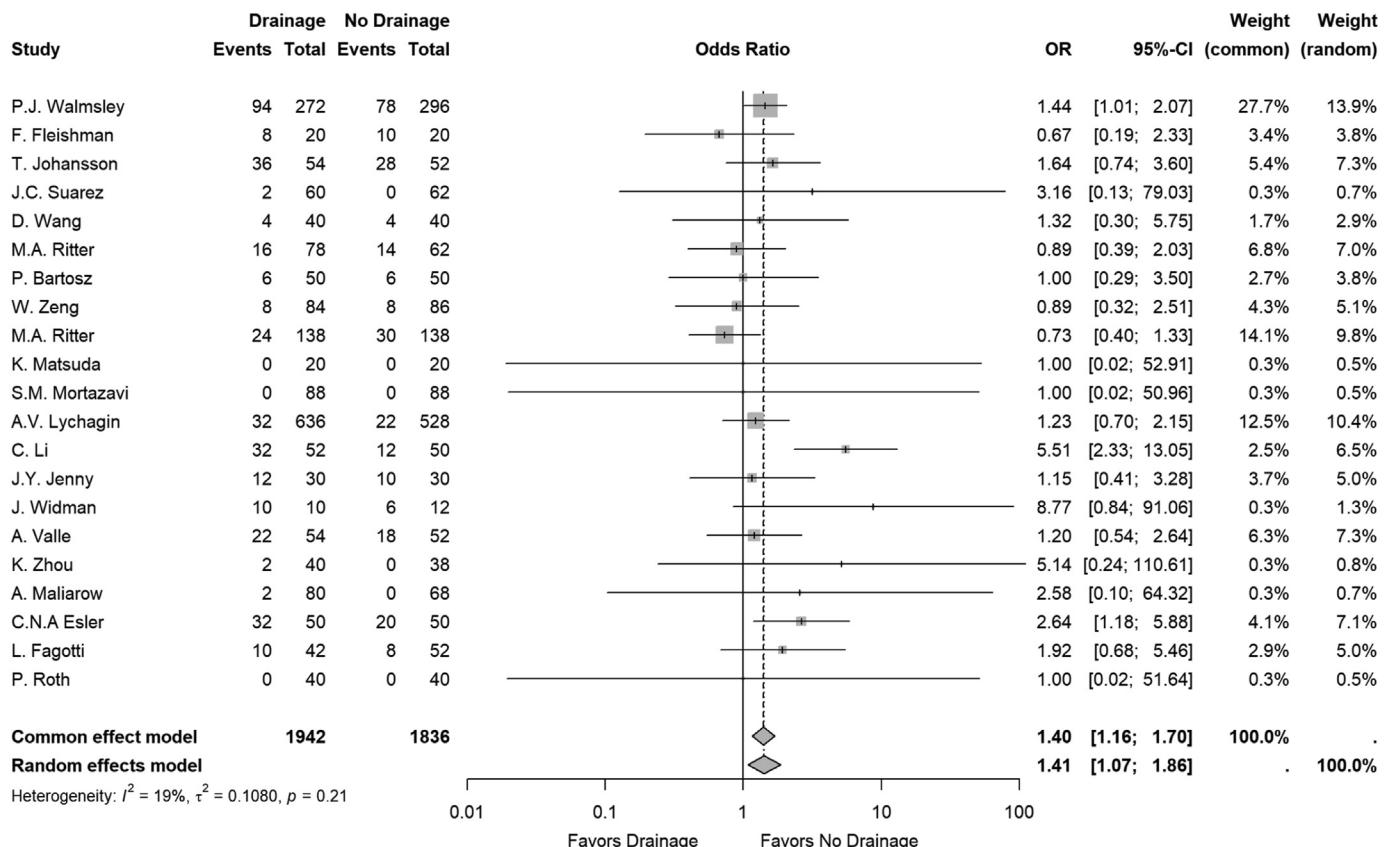


Figure 3. Meta-analysis blood transfusion rate after both hip and knee arthroplasty.

Based on our understanding of the current literature, there is little evidence for the use of surgical drains in routine primary total hip and knee arthroplasty. The use of a drain may paradoxically lead to a higher volume of blood loss, the need for allogeneic blood transfusion, and the potential for the introduction of infection. In addition, the cost associated with the use of surgical drains, besides the cost of drains, may include the higher rate of reoperations, possibly because of inadvertent suturing of the drain, and the need for a health care professional to remove the drain.

CRediT authorship contribution statement

Pawel Bartosz: Writing – original draft, Visualization, Methodology, Investigation. **Burak Akan:** Writing – review & editing. **Vladislav Bartak:** Writing – review & editing. **Jerzy Bialecki:** Writing – review & editing, Investigation. **Laszlo Bucsi:** Writing – review & editing. **Wei Chai:** Writing – review & editing. **Rafal Kaminski:** Writing – review & editing, Formal analysis. **Nandor J. Nemes:** Investigation. **Javad Parvizi:** Writing – review & editing, Supervision. **Toshiyuki Tateiwa:** Writing – review & editing. **Akos Zahar:** Writing – review & editing.

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