SSI and PJI, the confounding effect of increased surgical time may be influencing the relationship between tourniquet time and postoperative infections.

There is still much debate over the efficacy of tourniquet use to decrease perioperative blood loss. Ledin et al. conducted a RCT on 50 consecutive TKAs on the use of a tourniquet and found no difference in calculated perioperative blood loss [15]. The meta-analysis by Zhang et al. found that calculated blood loss was greater without the use of a tourniquet, however this did not result in a greater transfusion requirement [10]. Conversely, a meta-analysis by Jiang et al. found that tourniquet use did decrease transfusion requirement in the pooled analysis of 1,450 knees [16]. As allogeneic blood transfusion is a known risk factor for SSI and PJI, limiting blood loss is an important aspect of infection prevention [17–20].

Another concern with the use of a tourniquet during TKA is whether appropriate antibiotic prophylaxis is administered to the surgical site. Friedman et al. evaluated soft tissue and bone concentrations of antibiotics given one minute, two minutes and five minutes prior to tourniquet inflation and found the highest concentrations to be when antibiotics were administered five minutes prior to inflation [21]. Yamada et al. found that when cefazolin was administered 15 minutes prior to inflation, the concentration in bone and soft tissue at the surgical site were above the minimum inhibitory concentration (MIC90) for methicillin sensitive *Staphylococcus aureus*, but below the MIC90 for cephazolin resistant coagulase negative staphylococcal species [22]. Young et al. found that by administering antibiotic prophylaxis intraosseously, higher regional antibiotic concentrations could be achieved, however the clinical efficacy of this in reducing the rates of SSI and PJI still need to be evaluated [23].

The effect that the use of a tourniquet has on the incidence of SSIs and PJIs following TKA has not been fully evaluated. The RCTs of this subject have been of small cohorts of patients that lack the power to evaluate these complications. The meta-analyses on this topic also have not been able to definitively comment, as many studies did not report the incidence of SSI and PJI in their cohorts. Moving forward, studies evaluating the use of a tourniquet during TKA should consider SSI and PJI as a secondary endpoint so that future pooled analyses may be better able to elucidate a connection, if one exists.

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Authors: Nicholas Giori, Giovanni Balato, Michael Hirschmann

QUESTION 2: Does the surgical approach (parapatellar vs. subvastus) during primary total knee arthroplasty (TKA) affect the incidence of subsequent surgical site infections/periprosthetic joint infections (SSIs/PJIs)?

RECOMMENDATION: The incidence of SSIs/PJIs after primary TKA is not influenced by the surgical approach (parapatellar vs. subvastus).

LEVEL OF EVIDENCE: Moderate

DELEGATE VOTE: Agree: 97%, Disagree: 1%, Abstain: 2% (Unanimous, Strongest Consensus)

RATIONALE

The medial parapatellar approach and the subvastus approach are the most common approach techniques for primary TKA [1]. To date, the question of the best surgical approach for primary TKA is still a matter of debate [2]. Despite the vast body of literature investigating the clinical outcome of patients undergoing TKA with either the medial parapatellar or the subvastus approach, only a limited number of studies focus on their infection rates.

There have been four meta-analyses published to date that compare the subvastus to the medial parapatellar approach as well as one meta-analysis that compares subvastus to quadriceps-sparing approach, which are included in the following references below [1,3–6]. Regarding infection risk, none of these five meta-analyses found a difference.

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Authors: Eleftherios Tsiridis, Stefano Bini, Majd Tarabichi, Eustathios Kenanidis, Anastasios-Nektarios Tzavellas

QUESTION 3: Does the surgical approach of primary total hip arthroplasty (THA) affect the incidence of subsequent surgical site infections/periprosthetic joint infections (SSIs/PJIs)?

RECOMMENDATION: The surgical approach in primary THA does not affect the incidence of subsequent SSIs/PJIs.

LEVEL OF EVIDENCE: Strong

DELEGATE VOTE: Agree: 88%, Disagree: 10%, Abstain: 2% (Super Majority, Strong Consensus)

RATIONALE

Many approaches to expose the hip joint have been described. Surgical approaches for THA have evolved to include a minimally invasive posterior approach to minimize soft tissue damage, a resurgence of the direct lateral approach to address concerns of instability and the increased popularity of direct anterior surgery to improve postoperative recovery. Smaller skin incisions combined with less soft tissue damage and improved pain management techniques have resulted in faster recovery times, quicker rehabilitation and shorter hospital admissions. However, the impact of these approaches on the risk of infection has not been studied extensively. We report data from randomized control trials (RCT) and large registry data bases to support our conclusions.

In the English literature, 37 RCTs were found comparing functional and other postoperative results using different surgical approaches for primary THA. None of these, however, was designed to study PJI as the primary outcome. Fortunately, PJI is frequently reported as a secondary outcome. More than half of the RCTs identified (20/37) compared a conventional approach to a minimally invasive approach ("mini"), 12 studied two conventional approaches and 5 evaluated two mini-approaches. The posterolateral (PL) approach in both its standard or minimally invasive iterations were the most frequently examined (22). The primary outcome in the majority (30/36) of these RCTs was the functional assessment of the patients. The sample size of RCTs ranged from 20 to 219 THAs.

In the RCT with the greatest reported sample size, Ogonda et al. [1] followed 219 patients operated through either a standard or minimally invasive PL approach for six weeks. No infections were observed in the standard posterior approach (PA) group, while one deep and one superficial infection were found in the minimally invasive surgery (MIS) group. In another report, Xie et al. [2] studied 92 patients with unilateral primary osteoarthritis who were randomized to undergo a THA using either a supercapsular, percutaneously assisted approach or a conventional PL approach. An intention-to-treat analysis was used, but no infection was noticed in either group. Kim et al. [3] reported one infection in a study in which a mini-posterior approach was compared to a standard PL group. Goosen et al. [4], in a RCT of 120 THAs, described one infection in the "classic" group and no infections in their "MIS" group. Due to the low incidence of PJI, these trials did not have the statistical power to evaluate the relationship between surgical approach and SSI/PJI.

Eight meta-analyses [5–12] of these RCTs have been conducted to compare postoperative results of primary THA when using different surgical approaches: three compared "mini" approaches to standard ones [8,10,11], one compared mini vs. standard PL [7], one compared a direct lateral (DL) vs. the direct anterior approach (DA) [9], two compared PL vs. DA [5,6], and one compared DA, PL, lateral approaches (including the Watson Jones and modified Hardinge approaches), and two incision surgeries [12]. Two of these eight meta-analyses [6–11] were designed to specifically report significant differences in the complication rates between surgical approaches. Putananon et al. [12] performed a network meta-analysis of 14 RCTs (1,017 patients) comparing DA, PL, latera, and two incision [12] approaches and concluded that PL had the lowest risk ratio for overall complications including infection. The systematic review and meta-analysis of Miller et al. [5] was designed to compare postoperative complications of prospective and retro-