

## Periarticular Injection Practices in DICON/DASON Hospitals

### What are Periarticular Injections?

With the aging of the “baby boomers” and growing demand for improved mobility and quality of life the frequency of total hip replacements (THRs) and total knee replacements (TKRs) continues to increase. In fact, joint replacements are projected to be the most common elective surgical procedures in the coming decade.<sup>1,2</sup> Effective management of postoperative pain associated with joint replacement surgery influences surgical outcomes by improving post-operative mobility, and reducing the duration of hospitalization.<sup>3</sup> Local infiltration analgesia effectively reduces postoperative pain and thus it has recently been incorporated into the analgesic management regimens for many patients undergoing joint replacement surgery.<sup>4,5</sup>

Most periarticular injection (PAI) techniques involve infiltration of a high-volume, long-acting local anesthetic solution into the surgical incision and surrounding tissues at the time of surgery. Adjuvant medications such as epinephrine, ketorolac, opioids, or steroids are also frequently included in these injections.

In this newsletter we will review the benefits of PAI, surgical site infection (SSI) risks with the use of PAI, and finally PAI use in DICON and DASON hospitals.

### Benefits of Using Periarticular Injections

A meta-analysis by Jiménez-Alamonte et al found that patients who received PAI had lower pain scores at 24 hours following surgery and improved activity 48 hours after surgery compared to placebo/control patients (weighted mean difference [WMD], -0.61; 95% CI, -0.97 to -0.24;  $p = 0.001$ )<sup>6</sup>. Total opioid consumption by patients receiving PAIs was also significantly lower compared to placebo/control patients

(WMD, -7.16 mg; 95% CI, -11.98 to -2.35;  $p = 0.004$ ). However, there was no significant difference in post-operative pain scores in patients receiving PAIs and those who received nerve blocks (WMD, -0.36; 95% CI, -1.06 to 0.31). The same was noted for opioid consumption (WMD, -4.59 mg; 95% CI, -9.35 to 0.17).

### Infection Risk Associated with the Use of Periarticular Injections

The literature on whether the relative risk of infection in patients receiving PAIs is higher or the same as patients receiving other analgesic management regimens is inconclusive.

Marques et al, performed a systemic review and meta-analysis of 2,348 patients undergoing joint replacement surgery (909 THR, 1439 TKR). Eight cases of deep infection requiring surgical debridement or revision occurred in the cohort (overall infection risk of 0.34%).<sup>7</sup> Six cases occurred in patients who received PAIs (1.4%) and two cases occurred in patients without PAI ( $p=0.17$ ). The six patients with deep infection after PAIs received their PAI through a post-surgical catheter that remained in place following surgery. The authors emphasized that only a few studies reported long-term follow-up results thus the current literature on risk probably includes a diagnostic bias.

Jiang performed a separate meta-analysis of 13 selected studies which included infection rates in joint replacement surgery patients who received PAIs. The authors of each of these 13 studies reported no significant increase in “wound complications” in patients who received PAIs compared to those who did not.<sup>8</sup> Similarly, Wang et al performed a meta-analysis of ten studies that comparing pain control in patients who received PAIs and patients who received a nerve block.<sup>9</sup> Surgical complications were included in 5 of these 10 studies. There was no statistical difference in wound complications in these 5 studies (odds ratio = 1.57; 95% confidence interval = 0.40 to 6.16;  $P = 0.52$ ).

Even though the design of many of the preceding studies preclude a definitive answer to the question of whether the use of PAIs relatively increase the risk of a SSI, it is notable and important that the reporting rates of infection-related complications in patients undergoing PAIs has been remarkably low.

Despite the above discussion, from a theoretical and practical perspective, there are numerous potential risks for the introduction of bacteria into the joint space or incisional tissues with the use of PAIs. For example, most drugs used in PAIs are prepared (compounded) in the OR without the use of a sterile hood. Furthermore, operating room personnel who lack formal training in drug preparation/compounding are often responsible for preparing the injections. In addition, bacteria may be introduced through the skin at the time of insertion if external catheter are utilized in giving PAIs. Finally, many surgeons also added corticosteroids as an adjuvant medication in these injections, which may indirectly increase the risk of infection.

At this time there is no definitive evidence that the use of PAIs increases the risk of SSI associated with THRs or TKRs. However, additional research is needed in order to appropriately answer this question.

## Current DICON/DASON Hospital Practices

Twenty of 42 DICON/DASON hospitals participated in a survey of PAI use in December 2017. Sixteen of 20 surveyed hospitals reported that PAIs were routinely used in patients undergoing joint replacement surgery. PAIs were used in patients undergoing TKRs in all 16 of these hospitals all but two of these 16 hospitals also used PAIs in patients undergoing THRs. Three of these 16 hospitals also reported the use of PAIs for other joint replacement surgeries. Morphine, bupivacaine and ketorolac were used in PAIs in 5 hospitals. The remaining eleven hospitals reported using highly variable and different combinations of medications. PAIs were prepared in the OR in 12 hospitals; four hospitals prepared the drugs used in PAIs in their pharmacy. Three hospitals reported the occurrence of clusters of SSI that were suspected to be associated with the use of PAIs.

## Recommendations for Hospitals

- Currently there is no definitive evidence that the use of PAIs increases the risk of SSI associated with TKR or THR surgeries.
- However, despite this scrupulous attention to aseptic technique is important when PAIs are used.
- We believe that PAIs should be compounded sterilely in the pharmacy rather than within the OR.
- We recommend not using steroids as part of the PAI “cocktail.”
- We encourage infection preventionists to make note of SSIs associated with the use of PAIs. Infection preventionists should have a low threshold to investigate the hospital’s practice of administering PAIs if there appears to be an increase in SSIs with the use of PAIs.

## References

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