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CASE REPORT

Can peripheral nerve blocks contribute to heel ulcers following total knee replacement ?

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Peripheral nerve blocks are widely used for postoperative analgesia following total knee replacement. We would like to present three cases of heel ulcers encountered following a peripheral nerve block for knee replacement surgery. Postoperative heel ulcers have resulted in delayed rehabilitation in all three patients. Attention needs to be given to the pressure points in the foot after the nerve blocks. Awareness of this uncommon complication is necessary to prevent its occurrence.

INTRODUCTION

Pain is a complication of surgery. Sixty percent of patients experience severe pain following surgery (*3*). Therefore, postoperative pain management becomes an important part of preoperative planning. The aims of effective pain relief in orthopaedic surgery are patient comfort, early ambulation, effective physiotherapy and timely discharge. Growing pressure due to national targets on discharges (*14*) and patient expectations put pressure on the system for the early discharge of postoperative patients. This in turn demands early rehabilitation. We have recently encountered three cases of total knee replacement that developed heel ulcers after peripheral nerve block.

MATERIALS AND METHODS

Case 1

A 57-year-old male, with osteoarthritis of his left knee and no preoperative deformity underwent total knee arthroplasty under spinal anaesthesia. Femoral and sciatic nerve blocks were performed for postoperative analgesia with 20 ml of 0.375% bupivacaine for each nerve. Tourniquet time was 91 minutes at 300 mm Hg. On the first postoperative day, erythema was noted on the left heel. This formed a blister in 48 hours, which progressed to grade 2 pressure ulcer. The postoperative sensory impairment from the nerve block was noted to last beyond 24 hours. His rehabilitation was delayed due to the heel ulcer. During early rehabilitation, a 20° flexion deformity was noted. Gait was impaired in the heel strike phase. The heel ulcer healed with conservative

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treatment in 8 weeks. He regained complete extension during this period.

Case 2

A 63-year-old male underwent total knee replacement for osteoarthritis on the right side, under spinal anaesthesia. He had a preoperative 10° fixed flexion deformity that was completely corrected during the surgery. Femoral and sciatic nerve blocks were performed with 20 ml of 0.375% bupivacaine for each nerve. Tourniquet time was 95 minutes at 300 mm Hg. On the first postoperative day, erythema was noted on the right heel. This formed a blister in 48 hours, which progressed into a pressure ulcer of grade 3 severity. His rehabilitation was delayed due to the heel ulcer. During early rehabilitation, a 25° flexion deformity was noted. Gait was impaired in the heel strike phase. The ulcer was managed conservatively and healed within 9 weeks. He regained full extension during this period.

Case 3

A 72-year-old female underwent total knee replacement for osteoarthritis of her left knee under general anaesthesia. She had no preoperative deformity. Femoral and sciatic nerve blocks were performed using 20 ml of 0.25% bupivacaine for each nerve. Tourniquet time was 90 min at 300 mm Hg. She developed myocardial ischaemia in the postoperative period and was transferred to the high care unit. Erythema was noted over the left heel after 24 hours, that blistered in 48 hours. This progressed to ulcer of grade 2 severity. She had 0-80° of movement postoperatively. Her gait was impaired in heel strike phase due to the painful heel ulcer. The ulcer healed in 32 weeks with conservative management. Eventually the movement improved from 0° to 100°.

DISCUSSION

Postoperative pain causes significant discomfort. This results in decreased mobility, and delayed rehabilitation (*4*). Physiologically, pain causes vasospasm resulting in a degree of peripheral shut down due to increased levels of circulating catecholamine and a hyperdynamic state due to tachycardia and shunting. Effective postoperative analgesia helps early rehabilitation, hastens functional recovery, and reduces hospital stay (*4*). It also induces a state of well-being and increases patient satisfaction with the surgery. Moreover effective physiotherapy along with mobilisation in the early postoperative period is essential for good outcome following total knee replacement (TKR).

The current approach to post operative pain control is multimodal and multidisciplinary. This not only includes drugs but also patient education preoperatively (*10*). The various modalities used include peripheral nerve blocks (PNB), lumbar and sciatic plexus block, continuous epidural infusion (CEI), patient controlled analgesia (PCA), regular non-steroidal anti-inflammatory drugs, opioid analgesics and complementary techniques (*10*).

There are various studies comparing the effectiveness of peripheral nerve blocks, continuous epidural infusion and patient controlled analgesia in controlling postoperative pain after total knee replacement (*5*). PNB and CEI provide better pain control. Moreover they decrease the need for supplementary analgesic for both opioids (*1*) and non-opioids. Decreased use of opioids decreases the incidence of hypotension, chest infections and respiratory depression (*13*). Both PNB and CEI reduce the hospital stay (*4*). Peripheral nerve block has the advantage of being safe and a less invasive procedure than CEI. CEI often results in hypotension (*12*). There has been great support in the recent years in the literature for the use of peripheral nerve blocks (*4, 5, 7, 11*).

Pressure sores are due to the tissue necrosis as a result of peripheral circulatory failure (*2*). The localised hypoxia leads to ischaemia, and accumulation of the products of anaerobic metabolism (*6*). A contact pressure of 100 mm Hg for 2 hours is sufficient to produce signs of typical pressure sore (*9*).

Pressure sores in heel and sacral regions have been reported after epidural anaesthesia (*8, 9, 12*). The literature search using Pubmed with key words pressure sores, peripheral nerve blocks, postoperative pressure sores, has not yielded any results for pressure sores developing after peripheral nerve blocks.

Three of our patients have developed pressure sore following peripheral nerve block for TKR. In all the three patients, the heel ulcer was observed on the second postoperative day. None of these

patients had any preoperative mobility problems. The ulcer developed on the side of the block in all the three patients. The skin over the contralateral heel and the sacrum was normal. Tourniquet time was with normal limits in all the three patients. The fact that two of our cases were done under spinal and one under general anaesthesia, indicates that the nerve block, which lasted for more than 24 hours in all the three patients, might have contributed to the development of the heel sores. Spinal anaesthesia wears off within hours and is usually bilateral. The quadriceps power and sensations in the distribution of the saphenous nerve were normal as soon as the effects of nerve block faded in all the three patients. We postulate that the painful heel ulcer could have interfered with the heel strike phase of the gait. This could have resulted in the inability to lock the knee resulting in loss of full extension of the knee.

CONCLUSION

Since in all our three cases, there was commonality in terms of surgery, side of ulcer and the nerve block, we believe that the peripheral nerve block might have contributed to the heel pressure ulcers. Attention needs to be given to the pressure points after a nerve block. This is even more important if continuous peripheral nerve block is planned for the lower extremity. Heel sore after a total knee replacement may lead to unsatisfactory outcome and litigation. Awareness of this complication amongst the treating medical and nursing team involved is necessary to prevent the occurrence of this potentially preventable complication.

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