CASE REPORT

Management of a full-thickness burn to the foot following sciatic nerve palsy secondary to primary total hip replacement

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SUMMARY

Sciatic nerve palsy following total hip replacement is a rare but serious complication. The neurological sequelae that follow range from pure sensory loss to combined motor and sensory loss involving most of the lower limb. The loss of nociceptive feedback predisposes patients to accidental damage to the lower limb. We present the case of a lady with sciatic nerve palsy who sustained full-thickness burn injuries to her foot via a hot water bottle. The dilemma between debridement and grafting following a recent history of surgical trauma (ie, total hip replacement) versus secondary healing via dressings and regular review is discussed. Although grafting is the standard treatment in such burns, we recommend secondary healing over grafting provided the burns are not extensive. This enables potential recovery of sensation and reduces operative trauma to the limb which may retard resolution of the neuropraxia.

BACKGROUND

Sciatic nerve palsy following total hip replacement (THR) is a rare but serious complication often with prolonged morbidity for the patient.¹ Total hip arthroplasty could affect all nerves surrounding the hip joint; however, approximately 80% of nerve injuries involve the sciatic nerve and its peroneal division.¹ The incidence of nerve injury following THR varies between 0.17% and 1%.² The neurological sequelae that follow may range, depending on the extent of nerve damage, from pure sensory loss to certain restricted dermatomes, to combined sensory and motor loss involving most of the lower limb.

In cases involving sensory loss to the foot, this may result in accidental damage owing to the loss of pain sensation. Owing to the loss of sensory feedback the patient is unaware of the resultant tissue damage caused. With regard to thermal tissue damage specifically, they may even go onto to develop full-thickness burns without realising the injury caused to their soft tissue.

In this report we outline the management of a burn to the dorsum and heel of the right foot in a female patient with complete sensory loss to her entire foot and lateral surface of her shin following sciatic nerve palsy secondary to THR.

CASE PRESENTATION

A non-smoking 62-year-old woman with a medical history of essential hypertension, was referred from the accident and emergency (A&E) department of

a local hospital to our regional burns service after sustaining a burn to the dorsum and heel of her right foot.

The injury was sustained via a hot water bottle which was in contact with the dorsum and heel of her right foot. Her right foot felt ice cold and she hoped that the hot water bottle would help to warm it up. The bottle was in contact with her foot for approximately 5 min after which she noted blisters. She presented on the same day to her local A&E department who cleaned the burn wound and dressed it with paraffin gauze. She attended three times as an outpatient before being referred to our specialist burns unit on day 5 postburn as her wounds were not healing.

On inspection, there were two well demarcated full-thickness burns involving the dorsum and heel of her right foot with approximate areas of involvement of 10–11 cm² (figures 1 and 2). Both wounds appeared clean with no signs of infection. Both the posterior tibial and dorsalis pedis pulses were palpable. Neurological examination revealed loss of sensation of light touch, pin prick and vibration from the mid-calf level. The ankle jerk and plantar reflexes were also absent. In addition, she had foot drop with loss of dorsiflexion and plantarflexion at the ankle as well as loss of abduction of the toes. This combination of sensory and motor deficits suggested palsy of both the common peroneal and tibial nerves. This was secondary to a confirmed history of sciatic nerve palsy, following primary THR of her right hip 2 months previously.

Owing to the lack of sensory feedback the patient continued normal usage of the limb resulting in the poor healing of her wounds. We took the decision to treat her injuries conservatively with

Figure 1 Full-thickness burn to the dorsum of the right foot.

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Figure 2 Full-thickness burn to the heel of the right foot with flattening of the curvature of the heel owing to pressure on it.

dressings and allow them to heal secondarily. A detailed discussion of the reasons behind this approach over that of the standard debridement and grafting applied to full-thickness burns is provided in the discussion section.

INVESTIGATIONS

The primary investigation confirming sciatic nerve palsy in this patient involved nerve conduction studies. This was performed at the same hospital where she had her THR inserted. The nerve conduction studies confirmed that the patient's symptoms were secondary to common peroneal and tibial nerve palsy with the implicated cause being her recent THR.

TREATMENT

The patient was advised to refrain from weight bearing on the heel. Furthermore we also advised her to use footwear that

would reduce pressure on the heel and would lead to a better overall distribution of pressure on the sole of her foot. The burn wounds were dressed with a non-adherent silicone dressing, which was the primary contact layer with the wound. The burn wound at the heel had a further foam layer applied beneath the silicone dressing to reduce pressure. An absorbent dressing was then applied as the final layer over both the burn wounds.

OUTCOME AND FOLLOW-UP

She was initially reviewed and her dressings changed every 3 days. As the wound showed signs of healing, she was reviewed weekly. On this regimen, her wounds healed completely within a period of 6–8 weeks. Figures 3 and 4 show the wound completely healed at a period of 3 months.

DISCUSSION

Sciatic nerve palsy, although a rare occurrence in primary THR, can lead to sensory and motor deficits in the lower limb. Burn injuries to the feet in such cases with sensory deficit maybe sustained in a number of ways including therapeutic foot baths, hot water bottles, pillows warmed by heated stones, walking on hot sand and resting ones lower limb against a heat source such as a radiator.³ In our case, the sensory deficit, particularly loss of nociceptive feedback, resulted in accidental thermal damage to the foot. This is similar to accidental traumatic damage to the feet of patients with diabetic neuropathy.⁴ Furthermore, in such cases the loss of sensation results in the patient continually weight bearing on the damaged foot resulting in continued traumatic damage and extension of the wound site. The best way to combat this is to educate the patient by explaining to them the continued negative effects of weight bearing on such a wound and as to why pressure relief is important. Furthermore, adjustments to footwear should be made to relieve pressure at the affected site if possible.

Sciatic nerve palsy may resolve within hours or maybe permanent depending on the cause. Sciatic nerve palsy secondary to THR usually resolves within 12–20 months.^{1–5} Risk factors for nerve injury during THR include female gender, overweight patients, prolonged procedure time and significant lengthening of the extremity. The injury to the nerve itself may occur in several ways and includes: nerve division, ischaemia, compression or distraction, intraneural haemorrhage, extrusion of bone cement or the heat of its polymerisation, dislocation or reduction of the femoral component and compression by haematoma

Figure 3 Fully healed burn wound at 4 months with hypertrophic scarring at the site of healing.

Figure 4 Fully healed burn wound at the heel of the right foot at 4 months postinjury.

or bony prominences.^{1 2} However, in most of the cases it is difficult to clearly elucidate the cause of nerve injury.

The dressings used should be chosen after careful consideration of the wound site. In our patient, the wounds were clean with a minimum quantity of exudate and hence a non-adherent silicone dressing was considered to be an appropriate choice. Furthermore, an additional foam layer was employed at the heel to reduce pressure. In situations where the wound maybe infected or where there may be large amounts of fluid exudate from the wound, antimicrobial and/or dressings with significant absorbent properties should be considered. In our case the wounds healed completely within a 5-week to 6-week period. This may have been assisted by the fact that the patient was a non-smoker with no history of systemic diseases such as diabetes which may have negative effects on wound healing.

Debridement of the full-thickness eschar without grafting is an option in the management of full-thickness burns. This helps to rid the wound of eschar, which may be a potential source of infection, and may even lead to an increase in the time for complete wound healing to occur. However, we refrained from debriding the wounds as the patient only recently had a THR inserted and needed to remain mobile from a rehabilitation perspective. In addition, her wounds were clean with no signs of an infection brewing. We felt that debriding the wounds in this circumstance would only retard the patient's progression in terms of rehabilitation for her hip replacement.

On the surface, this case appears simple and uncomplicated, 'it's a case of treating a burn to a foot that has lost sensation'. However, the treatment of the burn wounds discussed in this case provides a unique challenge compared to treatment of burn wounds in neuropathic diabetic feet for two reasons. First, there is potential for regaining sensation as the sciatic nerve palsy resolves (neuropraxia). This is unlike in burns occurring to neuropathic diabetic feet, where there is almost no potential for regaining sensation. Second, any further surgical trauma inflicted on the limb may result in regression of regained nerve function and this may potentially inhibit the return of sensation back to the limb, particularly in the regions on which the burn wounds were present. Hence, although operative intervention with debridement and skin grafting would have been the standard treatment option for the full-thickness burns sustained in our case, it was not applied as grafting the burn areas would have left them partially insensate and may have also affected recovery from the neuropraxia owing to further operative trauma. Hence we chose to manage her wounds conservatively with dressings and let the full-thickness burns heal secondarily. Finally, a conservative approach avoids the possible complications of graft failure and donor site morbidity.

In conclusion, this is the first reported case of conservative treatment of a full-thickness burn in a lower limb affected by sciatic nerve palsy secondary to THR. These burns are unique in their nature and require careful consideration prior to treating them either with debridement and grafting or allowing them to heal secondarily with carefully chosen dressings. As long as the burn wounds are not extensive, we recommend secondary

healing over grafting as this enables potential recovery of sensation and reduces operative trauma to the limb which may retard resolution of the neuropraxia.

Learning points

- ▶ Sciatic nerve palsy is a rare but serious complication of total hip replacement.
- ▶ Accidental damage may occur to the lower limb in cases of sciatic nerve palsy owing to the loss of nociceptive feedback. Burns are a particularly common mechanism of injury in patients with the loss of nociceptive feedback.
- ▶ Burn injuries secondary to sciatic nerve palsy have the potential to regain full sensation as the neuropraxic nerve injury resolves. However, this would only happen if the burn wound is allowed to heal secondarily. This ability to regain sensation is lost if these injuries are treated with debridement and grafting.
- ▶ However, it is essential that the clinician consider other aspects such as percentage of total burn surface area (TBSA) involved and if the burn wound is infected when deciding between conservative management and surgical debridement and grafting.
- ▶ If conservative management is chosen to be the preferred option, the dressings used should be chosen after careful consideration of the percentage of TBSA, depth and location of the burn, and other factors such as quantity of wound exudate and wound infection. In addition, these wounds require a great deal of patient cooperation for successful healing. Hence the importance of patient education with regards to wound care in such situations cannot be overemphasised.

Contributors SJ is the author of the manuscript. QF is the editor of the manuscript. NEM contributed to the conception of the case report and edited the final manuscript submitted. PD was responsible for further editing and revisions of the final manuscript.

Competing interests None.

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