February 10, 2014

Cases in Diabetic Foot Care

The authors, William Munro and Derek Jones, won first prize for a poster entitled "*Clinical Experience of the Pressure Relief Ankle-Foot Orthosis (PRAFO)*" at the Allied Health Professions Clinical Effectiveness and Practice Development Conference held in Scotland.

Derek Jones is shown receiving the prize from June Wylie of NHS Quality Improvement, Scotland

This note describes two cases from that study highlighting the severe challenge that diabetic foot care can present to the multi-disciplinary care team. The creation of a protective environment, relieving pressure and shear in the region of an ulcer site, is shown to be a powerful influence on healing. These cases also highlight the fact that orthotic interventions can be extremely cost-

effective and generally represent just a small proportion of the total spectrum of treatment cost.

Background

Diabetic foot problems have long been recognised as a serious health care challenge and a situation in which prevention of tissue breakdown through attention to the mechanical loading upon tissue has been of great importance. It is now recognised that many amputations may be prevented through attention to appropriate foot care. Whether in healing or preventing foot ulcers, effective orthotic strategies are vital.

Research has shown neuropathy to be the predominant causative factor in the development of foot ulceration (Walters et al, 1992; Levin, 1995; Boulton, 1998; De et al, 2001). In combination with repeated minor trauma, it is the primary cause of diabetic foot ulceration, rather than ischaemia (Pecoraro et al, 1990).

Diabetic foot problems can develop extremely quickly, with tissue breakdown occurring rapidly and often complicated by infection (Edmonds et al, 1986). Once ulcers are formed, they are often slow to heal. In recent years there has been a consensus that the wound healing process in diabetes contributes to the development of diabetic foot ulcers (Veves et al, 2000). The normal course of wound healing in people with diabetes appears to be hindered by many factors, including specific metabolic deficiencies and impaired physiological responses (Boulton, 1988; Pecoraro, 1991; Olerud et al, 1995)

The authors utilise a range of orthotic and other interventions based on an individualised clinical presentation and anticipated risk. The clinical process is truly multi-disciplinary with orthotist, nurse specialist and podiatrist working alongside other members of the team with a shared understanding of the plan.

Treatment Planning

An overall management plan must deal with both the “internal” medical environment – managing optimum blood sugars and infection for example, and the mechanical environment. Whether for prophylaxis or healing, there is a need to protect the foot from further mechanical damage which is about eliminating any pressure or shear at the wound site and adjacent tissue. The PRAFO allows mechanical support to be provided in the region of the heel and malleoli without requiring the wound site to be enclosed. This allows for exudate wound dressings to be

monitored and changed according to need. To be effective the treatment plan requires good cooperation between the podiatrist and orthotist.

Ambulation, where possible, should be undertaken at the earliest opportunity to facilitate improved circulation. Mechanically it is important to provide controlled positioning of the foot and protection at initial contact of each stride. Controlled pressure distribution during stance phase allows the physiological norm to develop and aids venous return.

Figure 1 - PRAFO with Pad & Strap Kit

Early work using motion analysis and pressure sensing technology allowed the orthotist to verify that controlled adjustment of the posterior upright of the PRAFO was valuable to control pressure at the plantar surface of the foot. Adjustments manage the foot-ankle position and the time history of pressure distribution at the foot and heel. Lessons from this are now applied in routine practice. The aim is always to allow early, protected ambulation. Early mobilisation is good for patient morale and generally reduces pain.

Our experience over seven years of using the Pressure Relief Ankle Foot Orthosis (PRAFO®) (Figure 1) with neuropathic and neuro-ischemic feet has allowed severe cases to be managed in addition to routine cases. This is highlighted with two cases.

CASE A

Observations

This individual initially presented from the community with a painful, sloughy, neuro-ischaemic ulcer. Poor compliance to diet/blood sugar regulation and other aspects of self care was recognised. The general care strategy was wound debridement, protection from further deterioration, attention to infection and blood sugars and consideration to amputation.
In this particular case, this individual declined amputation and so the challenge became one of careful management over a significant time. There are cost and ethical decisions to make around this type of case.

Care Process

Figure 2 - CASE A - Initial Presentation

Figure 3 - CASE A at 156 weeks

- Referral from community- painful, sloughy, black heel with medial ulcer worsening after 6 weeks treatment by GP practice
- Wound drained, dressed, IV antibiotics, PRAFO at night.
- 2 weeks; painful, worsening ulcer, calcaneum exposed; amputation suggested
- 2-24 weeks; cycle of debridement & dressing; IPOS during day; PRAFO at night
- 24 weeks removal of piece of calcaneal bone
- 54 weeks; no pain; callus debrided; area dressed; PRAFO still in use
- 156 weeks no pain; callus debrided; area dressed; PRAFO still in use.

Outcomes

At 160 weeks healing was established and amputation prevented. Long term multi-disciplinary care had been required with frequent nursing and podiatry professional input in addition to dressings and antibiotic care throughout the period. Two PRAFO had been used with liner changes and one hind-foot relief shoe had been used.

CASE B

Observations

This individual was involved in a road traffic accident fracturing his right femur and he was not initially recognised to be diabetic with neuropathy. Presenting with pain and fever, his long leg plaster cast was removed and a sloughy, septic ulcer was discovered. His limb was oedematous and cellulitic up to knee level. Amputation was offered and declined.

Care Process

- Debride ulcer, “Intrasite” dressing, IV antibiotics, and hospitalisation.
- PRAFO applied
- Slow progress first 6 weeks
- Infection eliminated by 10 weeks

Figure 4 Case B initial Presentation

Figure 5 - Case B at 56 weeks

- Granulating well, no slough, no pain after 12 weeks
- After 18 weeks change in dressing to “Honey & Tulle” (ulcer clean but healing static)
- After 22 weeks Allevyn Heel Cup applied
- At 32 weeks – contact dermatitis from Allevyn Heel Cup. Patient readmitted to hospital.

"Honey & Cod Liver Tulle" applied to dermatitis. Covered with Aquacel, & Lantor followed by Allevyn Pad to absorb exudates. Oral antibiotics.

- At 33 weeks improving – antibiotics continued.
- At 40 weeks still on oral antibiotics. Ulcer reducing
- At 44 weeks PRAFO for night use; IPOS Rear Foot for day use.
- At 50 weeks ulcer heeling well
- At 56 weeks heeled.

Outcomes

Amputation was prevented although the heel took more than one year to heal.
One PRAFO, was required through the process with liner changes as required. One IPOS hind-foot relief shoe was used from 44 weeks. The highest costs were associated with professional time, dressings and antibiotics.

Conclusion

These cases highlight situations where amputation or prolonged hospitalisation would be considered highly likely without orthotic intervention. Orthotic intervention with the PRAFO allowed protection and early mobilisation with early discharge from hospital.
The perception of some observers in the past has been that orthoses are relatively expensive. In our study, orthoses represented a very small proportion of the total treatment cost in terms of materials and professional time.
The clinical challenge is that once tissue break-down occurs significant time and resources are needed for the life of that limb. Frequently, the merits of ulcer prevention are acknowledged but effective strategies are often not in place. A hypothesis worthy of testing is that increased use of appropriate orthoses, with the intention of ulcer prevention, could be cost-effective in high risk groups.

References

1. Boulton AMJ (1998) "Lowering the risk of neuropathy, foot ulcers and amputation." Diabetic Medicine 15 (Suppl 4): S57-9
2. De P, Kunze G, Gibby OM, Harding K (2001) "Outcome of diabetic foot ulcers in a specialist foot clinic." The Diabetic Foot 4(3): 131-6
3. Edmonds ME, Blundell MP, Morris HE et al (1986) "The diabetic foot: impact of a foot clinic." The Quarterly Journal of Medicine 232: 763-71
4. Levin ME (1995) "Preventing amputation in the diabetic patient." Diabetes Care 18:1383-

94

5. Pecoraro PE, Reiber GE, Burgess EM (1990) ”Pathways to diabetic limb amputation: basis for prevention.” Diabetes Care 13: 516-21
6. Pecoraro RE, Ahroni JH, Boyko EJ et al (1991) ”Chronology and extremities of tissue repair in diabetic lower-extremity ulcers.” Diabetes 40: 1305-13
7. Veves A, Falanga V, Armstrong DG, Sabolinski ML (2000) ”Graftskin, a human equivalent, is effective in the management of neuropathic diabetic foot ulcers.” Diabetes Care 24(2): 290-5
8. Walters DP, Gatling W, Mullee MA et al (1992) ”The distribution and severity of diabetic foot disease: a community study with comparison to a non-diabetic group.” Diabetic Medicine 9(4): 354-8

Newer Post
Professor Mike Edmonds Speaks About Diabetes

ANATOMICAL CONCEPTS (UK) LTD, 8-10 DUNROBIN COURT, CLYDEBANK BUSINESS PARK, CLYDEBANK, G81 2QP, UK +44(0)1419522323 INFO@ANATOMICALCONCEPTS.COM