Non-Operative Treatment of Charcot Arthropathy

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Charcot Arthropathy is a progressive destruction of weight-bearing joints, most commonly involving the foot and ankle. The Charcot foot may present with a fracture, subluxation, or even frank dislocation. The two leading theories on the pathogenesis of Charcot feet are neurotraumatic and neurovascular. The neuro-traumatic theory hypothesizes that repetitive mechanical trauma to a neuropathic foot or ankle causes fractures, damage to joints, and eventual irreversible destruction of the normal architecture of the foot/ankle. The neuro-vascular theory attributes joint destruction to a loss of normal autonomic function which causes a cascade of bone resorption, hyperemia and periarticular osteopenia. The most likely pathogenesis involves a complex interplay of these theories.

Non-operative treatment consists of total contact casting, prefabricated boot usage or a CROW (Charcot Restraint Orthotic Walker) to maintain the foot and ankle in a plantigrade alignment as the Charcot process moves from the fragmentation stage of bone resorption to the consolidation stage of bone healing. Non-operative treatment is indicated when the foot and ankle present plantigrade or the patient has medical contra-indications to surgery. There is a wide surgeon variation on the variables of weight bearing, choice of immobilization device, duration of immobilization and the use of adjuvant biologics. The casts need to be changed frequently in order to ensure a proper fit and avoid skin compromise as the swelling resolves. With any immobilization device, follow-up is initially frequent to confirm the maintenance of limb and foot alignment. The economic impact of treatment with total contact casting can be significant when considering weekly or bimonthly casting, appointment travel and insurance co-pays.

Studies have evaluated markers of bone turnover in Charcot patients and suggest that osteoclast activity is increased in early Charcot disease. A measure of osteoclastic bone turnover, serum ICTP (carboxyterminal telopeptide type I collagen), has been shown to be elevated in acute Charcot feet. In an attempt to slow bone resorption by osteoclasts in the early fragmentation stages of Charcot feet, treatment with bisphosphonates have been trialed. Several studies have shown bisphosphonates to reduce the serum markers of bone resorption in the acute Charcot patient and to decrease the signs of the disease compared to controls. These medication options are in the investigative stages however show promise for the both the non-operative and operative Charcot patients.

Selected References: