Long-term Outcome of Charcot Reconstruction: A 20 Year Follow-up

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Statement of Purpose

This longitudinal study follows the long-term results of patients who underwent midfoot Charcot reconstruction. Variables of interest include those associated with morbidity and mortality. It was our aim to catalog the progression and durability of the reconstructed Charcot midfoot as well as the morbidity and mortality associated with this patient population.

Procedures

Patients who took part in this study underwent several reconstructive procedures at the discretion of the surgeon. A total of 3 surgeons performed a total of 9 different surgical combinations, but for simplicity these surgical procedures were listed separately. No statistical analysis was made between procedures. Fixation was performed with a combination of pins, screws and intramedullary "Beams". The procedures performed are outlined within Table 3. Every patient receive a posterior muscle group lengthening.

Results

55 patients were recruited for this study and were divided into three case-control cohorts (n = 10; n = 35; n = 5). A retrospective review of patient’s chart and x-rays were performed. Age and BMI of patients remained relatively homogenous throughout each cohort. With regard to co-morbidities, it was noted that duration of disease state was positively correlated with increased co-morbidities. With regard to morbidity, patients within the 20-year cohort demonstrated the greatest mortality rate at nearly 70%. The average length of relative limb salvage was 12.5 ± 4.5, 7.8 ± 3.0, and 5.8 ± 2.5. Additionally, reoccurrence of both deformity and ulceration rate was comparable across the 10 and 20 year cohorts, which may suggest a plateau effect amongst reoccurrence. Despite the similar reoccurrence frequency was more common within the 25-year cohort. Within the last several years, patients who have undergone Charcot reconstruction have increased their return to activity at nearly 25%.

Methodology

Patient data was collected between January 1, 1993 to January 1, 2010. Patients were recruited from two distinct foot and ankle centers and were divided into three cohorts (n = 10; n = 35; n = 5). Cohorts were determined based upon the time from the index operative procedure, divided into three cohorts (n = 10; n = 35; n = 5).

Results

A retrospective review of patient’s chart and x-rays were performed. Age and BMI of patients remained relatively homogenous throughout each cohort. With regard to co-morbidities, it was noted that duration of disease state was positively correlated with increased co-morbidities. With regard to morbidity, patients within the 20-year cohort demonstrated the greatest mortality rate at nearly 70%. The average length of relative limb salvage was 12.5 ± 4.5, 7.8 ± 3.0, and 5.8 ± 2.5. Additionally, reoccurrence of both deformity and ulceration rate was comparable across the 10 and 20 year cohorts, which may suggest a plateau effect amongst reoccurrence. Despite the similar reoccurrence frequency was more common within the 25-year cohort. Within the last several years, patients who have undergone Charcot reconstruction have increased their return to activity at nearly 25%.

Analysis & Discussion

No previous study has longitudinally reviewed patients with Charcot reconstructions of the midfoot. Study information suggests that the 20 year life expectancy amongst Charcot patients is near 75%, with a 5 year survival rate at 80%. These estimates are consistent with previous studies that place long-term survival at 35%. It should be noted that mortality rates amongst this population is often closely associated with multiple co-morbidities. In addition to mortality estimates we collected information regarding reoccurrence, hardware failure and amputation risk as well as ability to return to meaningful activity. Risk of overall amputation increased over time however the survivability rate within the 20-year cohort average 13.5 ± 2.2. This limb salvage rate is higher and longer than any previous reports. Patients who underwent limb loss were then isolated to a subgroup to find associated risk factors to limb loss. Patient’s return to meaningful activity has shown a rise in the last 10-15 years at nearly 25%. The maintenance of meaningful activity appears associated with reduced co-morbidities, further amputation and reduction in hardware failure. Further hazard regression models should be applied to find the greatest risk to long-term limb salvage. Evidence from this study suggests that Charcot reconstruction can be a durable procedure with less than 20 year limb salvage potential.

Literature Review

Morbidity and mortality associated with Charcot neuroarthropathy is well established within the literature. Gaits et al reported on the morbidity associated with Charcot patients within a specialty clinic. Within this population after 3.4 years, nearly 24% of their population was deceased. Other studies have suggested a much lower estimate regarding morbidity, placing a 5-year survival rate at nearly 90%. Such large variations in morbidity estimates, may suggest selection bias for the individual study cases. With regard to morbidity, many studies have cataloged common complications associated with reconstruction including: post-operative infection, amputation, re-ulceration, and reoccurrence. Sohn et al reports that a diagnosis of Charcot poses no increased risk of amputation when compared to a matched control group. Despite the similar reoccurrence frequency was more common within the 25-year cohort. Within the last several years, patients who have undergone Charcot reconstruction have increased their return to activity at nearly 25%.

References