Statement of Purpose

The purpose of this study is to directly compare the outcomes between fusion rates in a 1st Metatarsal-Cuneiform Arthrodesis of two surgeons. Each surgeon has a different postoperative weight bearing protocol for their patient’s with one surgeon following a more conservative weight bearing protocol and the other following a early weight bearing protocol. The aim of this study is to directly compare both study groups to determine if weight bearing earlier affects the rate of fusion among patient’s from a similar demographic.

Methodology & Hypothesis

The study is designed as a retrospective chart review between two different patient cohorts. Each chart review was performed on the same electronic medical records system between two surgeons patients. The chart reviews consisted of reviewing the date the procedure was performed to determine both time to fusion and total time to follow up. Each patient’s past medical and social history was reviewed and any pertinent history that would contribute to the outcome of their arthrodesis was recorded and compared. All operative and postoperative radiographs of the surgical site were reviewed to determine if the arthrodesis site went on to successful fusion or malunion/non-union. A successful fusion is considered osseous consolidation greater than 50% of the arthrodesis site on radiograph. The fusion rate was then determined between each cohort for comparison.

Hypothesis: Early weight bearing at two weeks postoperatively will not have a negative effect on rate of successful fusion when compared to patient’s following a conservative weight bearing protocol

Procedures

Surgical Procedure:
A total of 24 patients underwent a 1st metatarsal-cuneiform arthrodesis. Exposure was accomplished through a single dorsal incision over the 1st metatarsal-cuneiform joint. The joint was exposed and all articular surfaces were denuded of all cartilage using a saw, rongeur, or curette. Each arthrodesis site was then prepped with either a 2 mm drill bit or a 0.062” wire. Once adequate position of the 1st metatarsal and medial cuneiform was obtained, a cannulated lag screw is placed from distal to proximal for compression across the arthrodesis site. A dorsal locking plate is fixed across the arthrodesis site for increased stability. Following closure of the surgical site, each surgical extremity is placed in a short leg posterior splint and the patient is instructed to remain non-weight bearing.

Post-Operative Weight Bearing Protocols:
Group A: Patients were seen approximately 2 weeks postop for suture removal and transition from short leg posterior splint to short leg non-weight bearing cast. Patient follow up a 6 weeks follow up for short leg cast and instructions for progression to weight bearing at 6 weeks. Closure of the arthrodesis site was confirmed on radiograph.

Group B: Patients were seen at approximately 2 weeks postoperatively for suture removal and transition to a short leg fixed ankle walking boot. Each patient was allowed to partial weight bear in the boot at 2 weeks with progression to weight bearing as tolerated over the next 2 weeks. Patients remained weight bearing in the walking boot until bony consolidation of the arthrodesis site was confirmed and then transitioned to regular shoes.

Literature Review

1. Hansen et al. reported on a modified Lapidus procedure in 1989 with a successful fusion rate of 90% (36/40). They reported that best results were seen with multiple screw fixation and bone graft.

2. Thompson et al. reported a 96% fusion rate with 4% nonunion requiring revision in a total of 201 1st Tarsometatarsal Arthrodesis.

3. Monke et al. reported an 90.5% (192/21) union rate in patients who were allowed to weight bear early. Fixation was accomplished with a single compression screw and an H-locking plate. Patient’s were weight bearing at a between 3 and 7.5 weeks with a mean of 4.7 weeks.

4. King et al. reported a 97.8% (133/136) union rate in patients with cross-screw fixation and early weight bearing. Patients were partial weight bearing in a boot at a mean of 122 days and full weight bearing at 161 days.

5. Colton et al. reported a 98% fusion rate with early weight bearing using a plating interfragmentary screw coupled with a medial locking plate. Mean time to weight bearing was 10.9 days with a range from 5 to 28 days.

6. Basile et al. reported 100% union rate with immediate weight bearing in a walking boot with the use of crossed screw construct and a k-wire as a third point of stabilization.

Discussion

The union rate for Group A was consistent with historical data that reports approximately 10-12% nonunion rate. The patient did eventually go on to union after treatment with a bone stimulator. Group B had great results with a union rate of 100%. However, the wound complication rate in Group B was significantly higher with 4 out of the 14 having complications. Although, all wounds or infections were successfully treated with antibiotics or local wound care, there is possible concern that early weight bearing may have not allowed for adequate healing causing too much stress on the soft tissues. When compared to more conservative weight bearing protocols, early weight bearing does not appear to compromise the successful fusion rates, however there could be more concern if early weight bearing affects soft tissue healing in the early stages after surgery. No many studies in the literature has documented about early weight bearing effects are on the soft tissue healing since the main concern is osseous fusion of the arthrodesis site. This study is flawed in that it is a relatively small sample size for both groups. A larger study with more emphasis on wound healing as well as osseous fusion.

References


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Results

A total number of patient is 24 underwent a 1st Metatarsal-Cuneiform Arthrodesis with 10 patients in Group A and 13 patients in Group B. Group A had 90% (9/10) union rate with one nonunion that was successfully treated with a bone stimulator. Group B had a 100% (13/13) union rate with no nonunions. The average time to fusion was 9.6 weeks in Group A and 7 weeks in Group B.

Group A had zero wound complications. Group B had 28.5% (4/14) wound complications consisting of dehiscence or infection. All were successfully treated with oral antibiotics and/or local wound care.

There were no hardware failures in either group. Group A had no current smokers and group B had 7 current smokers.

In Group A, 9 out of 10 patients had concomitant procedures performed and group B had 9 out of 14. No procedures performed affected the weight bearing protocol in either group.