Early TAR Experience at Northwest Permanente

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I have no disclosures

Development of TAR program

- Prior to 2008 no TARs had been performed at Kaiser Northwest.  
  - Potential candidates were being referred out of system  
- Reluctant to begin performing TARs. Limited prosthesis options in the US with concerning failure and complication rates, or no follow up data at all.  
  - Fusion is a tried and true treatment option.  
- Patients increasingly requesting access to TAR.  
- With encouraging early results of 3rd generation implants now available in the US decided to develop a TAR program.

Goals of TAR program

- Provide TAR, in-house, as a surgical treatment option to NW Kaiser patients with ankle arthritis.  
- Recognized TAR is technically challenging with a rather steep learning curve with complication rate higher in earlier cases (Haskell & Mann, 2004; Schimmel, 2014).  
- Maximize successful outcomes.  
- Minimize complications, including those related to inexperience (the learning curve).  
- Provide long term close monitoring of TAR patients.  
- Create an internal TAR registry for outcomes monitoring.
Program Participants

- Two surgeons
  - Orthopedic surgeon with foot and ankle fellowship training and significant experience in knee arthroplasty.
  - Podiatric surgeon with extensive experience managing complex surgical problems of the hindfoot/ankle.
- Potential cases drawn from a captured population of ~500,000 NW Kaiser members

Patient Selection Criteria

- End-stage arthritis of the ankle refractory to conservative treatment (custom bracing, pain medications, activity modification, injections).
- Intact soft tissue envelope.
- Intact neurovascular status.
- No infection.
- BMI ≤ 32 in the early years, this was relaxed to < 40 in the later years.
- Age ≥ 50 with the exception of 3 "special" cases.
- Patient willing to have a low-impact lifestyle.
- No smoking.
- No diabetes unless very well controlled with Hgb A1C < 7 and absolutely no neuropathy.
- No active EtOH or drug abuse.

Preoperative Protocols

- Careful patient selection.
  - Cases in early years were "cherry picked" for straightforward cases without deformity.
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- Careful patient selection.
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- Careful preop counseling and education regarding TAR vs fusion.
- Preoperative medical work up including dental evaluation to ensure no active dental infection.
- Thorough LE exam including deformity evaluation.
- Appropriate preoperative imaging: standing tib/fib and ankle x-rays. Standing foot, hindfoot alignment, and hip-to-ankle views as needed. Stress x-rays on intra-articular deformity cases to determine correctability.
- Preoperative templating for distal tibial cut and implant sizing using TraumaCad software.

Intraoperative Protocols
- Two surgeons
- Careful soft tissue handling. Only brief use of self-retaining retractor during positioning of tibial cutting guide.
- Maintain tibialis anterior tendon in its sheath.
- Extensive use of fluoro. “Measure twice, cut once” motto.
- Correction of extra-articular deformities as needed.
- Careful attention to ligament balancing.
- Careful layered, including capsule, wound closure over drain.
  - now considering the use of negative pressure VAC incisional dressings.

Postoperative Protocols
- Splint for 3 weeks or until wound solidly healed.
- Most kept non-weight-bearing for 6 weeks.
- Once wound healed start ROM unless casting required due to other bony procedures.
- Physical therapy after 6 weeks for scar/soft tissue mobilization, edema control measures as needed, gait training, ROM and general LE kinetic chain strengthening.
- Follow up visits with imaging at 2-3 weeks, 6 wks, 3 mos, 6 mos, and then yearly.
Internal Registry

Volume Trend
- 70 TARs in 68 patients performed between April 2008 and December 2013.

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Cases with Minimum 1 Year Follow Up
- 54 TARs in 52 patients performed between April 2008 and April 2013.
- 21 women, 31 men
- Mean age 65 (range 42-80)
- Mean follow up 2.93 yrs, range 1 - 5.67
- Etiology: 33 PTA, 13 (14 ankles) OA, 5 RA, 1 (2 ankles) hemachromatosis
- Mean BMI 29 (range 20-38)
- 5 patients with diabetes, all well-controlled
- One patient moved out of state less than one year postop. One patient died at 5 yrs postop from unrelated cause. Remaining 50 patients with 52 TARs still active Kaiser members.

Results
- 32 cases without associated deformity
- 20 (38%) cases with associated deformity
  - Extraarticular: 1
  - Intraarticular: 19
    - Valgus incongruent: 7
    - Valgus congruent: 3
    - Varus incongruent: 8
    - Varus congruent: 1
    - 9 with 10 degrees or less
    - 10 (19%) with greater than 10 degrees, 5 with greater than 20 degrees malalignment
- Only 1/10 higher grade deformity cases was performed within the first 20 cases.
Results

- Implants: 36 Salto Talaris, 16 STAR
- 4 patients had undergone staged procedures for deformity correction prior to TAR.
- 10 (19%) cases required additional simultaneous procedures to correct bony deformity and/or ligamentous instability.

Results

- 6 (12%) cases required return to the OR for non-complication related procedures
  - Additional extra-articular bony deformity correction: 2 cases at mean 6 wks post TAR
  - Removal of symptomatic HW (medial malleolar screw): 1 case
  - Gutter/osteophyte debridement: 3 cases. 2 patients had improvement in symptoms, the 3rd had no improvement and remains dissatisfied.

Results

- There have been no implant failures or revisions to date, but it’s still very early...
- Ave postop AOFAS score: 84 (range 56-100), of 45/52 cases with available postop scores.
- 36/52 cases with complete pre- and post-op AOFAS scores
  - Ave 42 point increase from 43 to 85 between pre- and post-op scores (p < 0.001)
- 35/52 cases with available responses to questions regarding improvement in quality of life, would undergo procedure again, would recommend procedure to a friend.
  - 34 “yes”
  - 1 “no”

Complications – Glazebrook Classification

- Low Grade: 7 (13%)
  - Intraop nondisplaced MM fx: 2 (case #21 and #32), healed uneventfully
  - Delayed wound healing: 5 cases. 2 in the 1st 25 cases. 1 in diabetic, 1 in pt w/ RA
- Medium Grade: 3 (6%)
  - Subsidence: 1 case (case #50) with posterior subsidence of STAR talus component within 1st year. No coronal plane deformity. Seems to have stabilized. Patient asymptomatic. But I’m worried...
  - Postoperative MM stress fx: 2 cases (case #7 and #49), healed uneventfully with casting.
Complications

- High Grade: 2 (4%)
  - Major wound dehiscence requiring I&D x 3 and wound VAC tx: 1 (case #16). Pt w/ severe RA. Went on to heal and is doing well at nearly 4 yrs postop.
- Total # cases w/ complications: 12 (23%)

- Total of 8/52 (15%) cases required return to the OR for additional procedures
  - 6 not related to complications
  - 2 related to major complications.

Radiographic results

- Component malalignment: 8 (15%), 7 within 1st 20 cases
  - Varus tibial component: 1, ~4 degrees.
  - Excessive anterior tibial slope: 4
  - Excessive anterior tibial slope and talus too anterior: 1
  - Residual valgus talar tilt: 2 (~5deg)
- Osteolysis: 4 (7%)
  - Radiolucent lines around tibial tray but barrels/keel well-fixed: 2
  - Concerning ballooning osteolysis: 2, currently asymptomatic

Conclusions

- We have successfully established a TAR program at Kaiser Northwest.
- Our early outcomes are promising and are similar to those reported by high volume authors.
- Our major complication rate has been low.
- With increasing experience we have been able to address more complex cases without an increase in complications thus far.
- However, I remain very conservative with the use of TAR while awaiting longer term follow up of current prostheses.
- Ongoing critical evaluation of results is very important for this emerging and rapidly changing technology.

Future Directions

- Establish a more robust monitoring program through an integrated Kaiser TAR registry similar to our successful hip and knee replacement registries.
Thank you