



Trends in Foot and Ankle Surgery

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In collaboration with the American Orthopaedic Foot & Ankle Society, 4 presenters reviewed new data related to various aspects of foot and ankle surgery. The first 2 sessions focused on injuries sustained by athletes and dancers.

Sesamoiditis is a common overuse injury among athletes and dancers that is characterized by chronic inflammation of the sesamoid bones, which help elevate the bones of the great toe. Sesamoidectomy of the first metatarsophalangeal joint in athletically active patients may be indicated when nonsurgical care has failed. However, bilateral sesamoid excision can lead to alteration of joint mechanics or a cock-up deformity of the hallux [Cohen BE. *Foot Ankle Clin.* 2009].

J. Chris Coetzee, MD, Twin Cities Orthopedics, Edina, Minnesota, USA, pointed out that elite athletes with sesamoiditis—including dancers—can successfully return to ballet following excision of either the medial or tibial sesamoid bones [Bichara DA et al. *Foot Ankle Int.* 2012] and a short structured rehabilitation program. Dr Coetzee then discussed original findings from a retrospective review of 106 athletes in his practice who were dissatisfied with nonsurgical care and who subsequently underwent medial (n=84), lateral (n=22), or bilateral (n=5) sesamoid excisions from 2006 to 2013 with a mean follow-up of 31 months. The mean age of the patients was 44 years, and 72% were women.

All patients were referred to physical therapy to complete a structured program of rehabilitation goals starting at 1 to 2 weeks postsurgery. Surgical complications included chronic pain and instability (n=1) and symptomatic hallux valgus requiring surgical repair (n=2). Seven patients were lost to follow-up.

Preoperatively to 24 months, there was a significant improvement in the revised Foot Function Index (FFI-R); no significant change was noted from year 1 to year 2. At 2 years, > 85% of patients expressed satisfaction with their results, and 86% were able to return to their prior levels of sporting activity. Among these, 25% still reported pain in the metatarsophalangeal joint complex.

Brad R. Moser, MD, Twin Cities Orthopedics, Edina, Minnesota, USA, then spoke about posterior ankle impingement syndrome secondary to os trigonum syndrome, another common injury in dancers. Typically, the dancer will complain of discomfort during movements that require plantar flexion, such as the relevé or en pointe position. For these patients, open excision of the os trigonum may provide pain relief and a return to activity [Guo QW et al. *Arthroscopy.* 2010].

Dr Moser reviewed original outcomes data for 40 young dancers (35 women, 5 men) who underwent the procedure beginning in June 2006 and who were followed through January 2015. Mean age was 18.5 years, and mean follow-up time was 20.6 months. All patients also underwent specialized treatment with a team of dance physical therapists. The functional outcomes are presented in Table 1.

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Table 1. Functional Outcomes Following Open Excision of the Os Trigonum

	Preoperatively	Postoperative Follow-up
Veterans RAND 12-Item Health Survey		
Mental score	57.2-55.1	57.2-55.1
Physical score	38.0	52.0
Revised Foot Function Index	70.0	59.3
Visual analog scale	4.6	1.9



Three dancers suffered transient damage to the sural nerve, and 1 developed complex regional pain syndrome that lasted for >1 year. Only 2 patients did not return to their prior activity levels, although this was deemed unrelated to the procedure. Overall, the dancers were very satisfied with the results. Dr Moser emphasized that this procedure, when used alongside physical therapy, offers a low-risk, high-satisfaction option to young dancers who wish to return to their previous levels of activity.

The next presenter then turned to a surgical procedure for an injury more likely to occur among the general population—interdigital neuroma. If conservative treatment produces no relief, the standard surgical procedure is a simple neurectomy. However, some data suggest that neurectomy with intramuscular implantation of the proximal nerve stump also offers pain improvement [Adams S et al. *Foot Ankle Clin.* 2011].

Chamnanni Rungprai, MD, University of Iowa, Iowa City, Iowa, USA, reviewed original data from a chart review comparing outcomes among patients with interdigital neuroma who underwent either simple neurectomy or neurectomy with intramuscular implantation.

The chart review included 102 consecutive patients with 125 neuromas who had undergone surgery between 2000 and 2013 (Table 2). The same group of surgeons performed all of the procedures, and outcomes were evaluated using the FFI, the SF-36 Health Survey Update (SF-36), and the visual analog scale (VAS).

Both surgical procedures produced significant improvements in the FFI, the SF-36, and the VAS from baseline ($P < .005$, all). As expected, operating time was significantly longer in the implantation group ($P = .001$). Limitations of the study included its retrospective study design and the fact that approximately 50% of patients were lost to follow-up.

Dr Rungprai emphasized that, to his knowledge, this was the largest comparative study to date comparing outcomes between the 2 different procedures using validated outcome measures.

The fourth paper of the session provided information regarding bone drilling, which is relevant to every surgical procedure. All surgical instruments provide heat, which can induce osteonecrosis at a threshold of 70°C. Andrew Palmisano, MD, University of Michigan Health System, Ann Arbor, Michigan, USA, reviewed the results

Table 2. Study Demographics

	Neurectomy	Neurectomy + Implantation
No. of patients	66	36
No. of neuromas	78	47
Age at surgery, y	53.5 ± 14.3	50.9 ± 10.2
No. of men, women	10, 56	8, 28
Body mass index, kg/m ²	28.3 ± 6.0	29.6 ± 7.1
Follow-up, mo	44.6 ± 39.9	19.1 ± 46.2
Operative time, min	25.7 ± 6.2	33.5 ± 4.4
Neuroma: intermetatarsal space		
Second	25	14
Third	53	30
Fourth	0	3

of a study comparing the amount of heat produced by twist drills, Kirschner (K) wires, and cannulated drills of different sizes [Palmisano A et al. *J Orthop Trauma.* 2014].

Dr Palmisano explained that each piece of drilling equipment was driven into warmed human cadaveric tibia by a battery-powered hand drill, secured to provide a constant advancing speed (1 mm/s) during drilling. Two thermocouples were placed 0.5 and 1.5 mm from the drill hole margin and 2 mm deep to the surface. Eight tests were performed for each tool.

Heat production decreased as the diameter of the K wire increased. Conversely, heat production increased as the twist drill diameter increased. When all 3 tools were compared, the twist drill provided the least amount of heat; the cannulated twist drill produced the most. Differences in K wire size did not have much effect on heat production, suggesting that surgeons can be comfortable using whatever-size K wire will produce the stiffest construct.