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1096 Board #41 May 30, 9:00 AM - 10:30 AM

Meniscus Allograft Transplantation Allows Return To Sporting Activities

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(No relationships reported)

PURPOSE: The purpose of this study was to evaluate the effect of meniscus allograft transplantation on clinical outcome and return to sports independent of the degree of arthritis. We hypothesized that the procedure would allow previously high-level athletes to again participate in sporting activities without adversely affecting the survival of the meniscus allograft.

METHODS: Prior to surgery, patients underwent an informed consent process by an independent Institutional Review Board. Patients' activity levels were determined using the Tegner activity index. Athletes with a pre-injury Tegner level of 8 or higher with the following indications were included: knee joint line pain with irreparable damage or loss of a minimum of 50% of the meniscus. Exclusion criteria were less than one year of postoperative follow-up or health issues not related to the knee joint that would inhibit return to sporting activities. Sixty-seven patients were included in the final study population. The mean time from surgery to the most recent follow-up was 6.1 ± 4.2 years. The mean estimated survival of the meniscus allograft was calculated using Kaplan-Meier (KM) product analysis. Cox proportional hazards model was calculated to evaluate the combined effects of clinically relevant factors on allograft survival.

RESULTS: Medial meniscus transplantation was performed on 46 (68.7%) of the 67 patients and lateral meniscus transplantation on the other 21 (31.3%) patients. Median Tegner scores improved from 3 [IQR: 2, 5] pre-operatively to 5 [IQR: 3, 6] ($p = 0.003$) at most recent follow-up. Median pre-injury Tegner score was 9 [IQR: 8, 9] and the median highest Tegner score that these patients returned to was 6 [IQR: 4, 7]. Cox proportional hazard model revealed no significant effect by the clinical factors tested on the survival of the meniscus allograft. Eight (11.9%) patients experienced graft failure over the follow-up period: 7 medial and 1 lateral. KM estimated mean survival time was 12.8 ± .6 years (95% CI: 11.6 - 14.0 years).

CONCLUSION: This study shows promising long-term estimated survival of meniscus allograft transplantation in an athletic population. The procedure allows these patients to return to sporting activities.

1097 Board #42 May 30, 9:00 AM - 10:30 AM

Gender Differences in Bone Strength Exist Among Elite Athletes In Weight-bearing Sports

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(No relationships reported)

Studies in healthy, sedentary individuals show that males possess greater bone mineral density and a more robust skeletal structure compared to females. Increased loading (i.e., physical activity) and certain sport activities are known to exert beneficial effects on bone structure and strength.

PURPOSE: To examine gender differences in bone strength among athletes in both weight-bearing and non weight-bearing collegiate-level sports.

METHODS: Peripheral quantitative computed tomography was used to assess bone strength among 18-25 year-old elite ice hockey, swimming and running athletes (n=113; 51 male, 62 female) and non-active controls (15 male, 19 female). Total volumetric bone mineral density, total bone area, and bone compressive strength were assessed at the distal (4%) site of the tibia. Total and cortical bone area, cortical volumetric density, cortical thickness, and bone bending strength were measured at the tibia midshaft (66%).

RESULTS: At the midshaft, male athletes in weight-bearing sports (hockey, running) had greater bone strength compared to their female counterparts. Greater strength (+14.8%; $p < 0.05$) in hockey players resulted from greater total (+12%) and cortical area (+6.8%, both $p < 0.05$), while greater total (+9.5%) and cortical area (+14.9%, both $p < 0.05$) and cortical thickness (+10.1%, $p < 0.05$) resulted in greater strength (+16.6-18.4%, $p < 0.05$) in male runners. At the distal site, male hockey and running athletes had both greater bone compressive strength (+18.5%, +25.1%, $p < 0.05$) and total bone area (+17.7%, +14.5%, $p < 0.05$). No strength differences were found in swimmers at either site.

CONCLUSIONS: Our findings suggest that gender differences in bone strength exist even amongst elite athletes. Males in weight-bearing sports exhibited greater bone strength at both the distal and midshaft tibia sites. Congruent with sedentary populations, greater strength was due to more robust geometric parameters rather than greater bone mineral density. While higher bone strength may be attributed to larger body size and lean muscle tissue in males, surprisingly, no strength differences were evident between male and female swimmers, suggesting the need to further explore a possible attenuating effect of non weight-bearing activity on bone strength parameters between genders.

1098 Board #43 May 30, 9:00 AM - 10:30 AM

Disc Degeneration and Limbus Vertebra in Japanese Collegiate Gymnasts

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(No relationships reported)

Magnetic resonance imaging (MRI) studies have shown a higher frequency of radiological abnormalities such as disc degeneration (DD), and limbus vertebra (LV) among gymnasts. These 2 abnormalities seem to coexist at the same spinal level. However, their relationship remains unclear.

PURPOSE: To investigate the association between DD and adjacent LV in Japanese collegiate gymnasts.

METHODS: The subjects were 104 Japanese collegiate gymnasts (70 men and 33 women aged 19.7 ± 1.0 years, with 11.8 ± 3.6 years of sporting experience), and included Olympic and World Championship medalists. DD and LV were evaluated using T1- and T2-weighted MRI. DD was defined as reduced signal intensity of the intervertebral discs from L1/L2 to L5/S1. The grading system for the assessment of DD was based on the Pfirrmann classification, with grades 3, 4, and 5 indicating degeneration. LV was defined as separate, sclerotic, triangular ossicles adjacent to, but separate from the vertebral endplate. MRI was performed on all the gymnasts, and the images were evaluated by 2 experienced orthopedic surgeons, blinded to the clinical status of the gymnasts.

RESULTS: The prevalence of DD and LV in the gymnasts was 40.4% (42/104) and 20.2% (21/104), respectively. The incidence of DD was significantly higher in gymnasts with LV than in those without LV, as determined by the chi-square test. By using logistic regression analysis, a significant association of DD with LV (adjusted odds ratio (OR) = 8.54; 95% confidence interval (CI), 2.64-27.57) and with sporting experience (adjusted OR = 0.86; 95% CI, 0.76-0.99) was observed. In addition, we grouped DDs into those occurring in the upper (L1/2, L2/3, and L3/4 discs) and lower (L4/5 and L5/S1 discs) lumbar regions. The presence of upper DD was associated with adjacent LV (adjusted OR = 56.81; 95% CI, 8.87-363.68), and sporting experience (adjusted OR = 0.87; 95% CI, 0.70-1.07). Similarly, the presence of lower DD was associated with adjacent LV (adjusted OR = 8.45; 95% CI, 1.88-38.05), but not sporting experience.

CONCLUSIONS: Adjacent LV is associated with both, upper and lower DD, and may be an etiological factor for DD in Japanese collegiate gymnasts.

1099 Board #44 May 30, 9:00 AM - 10:30 AM

Whole-Body Vibration Attenuates Bone Resorption Marker Responses to Acute Resistance Exercise in Young Men

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Bone turnover marker (BTM) responses to acute exercise is an area of growing interest, however, few studies have examined BTM responses to combined resistance exercise and whole-body vibration (WBV).

PURPOSE: To investigate acute BTM responses to high-intensity resistance exercise with and without whole-body vibration in young men.

METHODS: 10 men (23.1 ± 1.9 years) participated in this randomized crossover study. 1-RM testing was performed for 4 lower body and 2 upper body isotonic resistance exercises. Subjects performed 2 protocols in random order separated by 2-week wash out periods: 1) resistance exercise only (RE) and 2) WBV + RE. For WBV + RE, subjects stood barefoot with knees slightly flexed on the vibration platform for 5, 1-minute bouts at 20 Hz and 1.25 mm (amplitude) separated by 1-minute rest intervals, followed by resistance exercise. For RE, subjects completed 3 sets of 10 reps at 80% 1-RM. Fasting morning blood draws were taken before (Pre), immediately post (IP) exercise, and 30 minutes (30P) after exercise. WBV + RE also included a blood draw