

Free Paper Session X: Sports Medicine

FP10.1

Comparison of clinical results in patients undergoing mini-open subpectoral biceps tenodesis versus tenotomy in arthroscopic shoulder surgery

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Introduction: Biceps tenotomy and tenodesis are two common options in managing biceps pathology. We aim at comparing clinical results in biceps tenotomy patients and mini-open subpectoral biceps tenodesis patients in our centre.

Methods: Patients underwent either biceps tenotomy or tenodesis from February 2019 to October 2020 were reviewed. The clinical outcomes at postoperative 3 months, 6 months and 1 year were reviewed. The parameters were American Shoulder and Elbow Surgeons (ASES) score, pain visual analogue score (VAS) and presence of Popeye sign.

Results: A total of 43 patients were included in this study. 22 Patients, 17 males and 5 females underwent tenodesis. The mean age (\pm SD) of tenodesis group was 60.1 ± 7.63 years old. 21 Patients, 5 males and 16 females underwent tenotomy. The mean age (\pm SD) of tenotomy group was 70.7 ± 9 . VAS pain and ASES scores improved significantly ($p < 0.00001$) from pre- to post-operative time points for both groups, with a mean difference of 70% and 35%, respectively at 12 months for tenodesis group; and a mean difference of 76.5% and 45.8%, respectively at 12 months for tenotomy group. However, there was no significant difference in VAS or ASES between two groups. There was no Popeye deformity in tenodesis group, while there was one Popeye deformity in tenotomy group.

Discussion and Conclusion: In our centre, tenotomy and tenodesis for long head of biceps tendon pathology both result in good clinical outcomes but there is a higher rate of Popeye deformity in the tenotomy group.

FP10.2

The use of five-strand hamstring autograft to increase the graft size in anterior cruciate ligament reconstruction—an early experience in Kwong Wah Hospital

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Introduction: The conventional way of hamstring autograft for anterior cruciate ligament reconstruction involves doubling both the semitendinosus and gracilis tendons to create a 4-strand graft. Studies have shown that graft diameter of < 8 mm is associated with a higher risk of graft failure. Several techniques have been described to increase the size of the graft. 5-strand hamstring graft involves tripling the semitendinosus tendon and doubling the gracilis tendon. We hypothesised that the 5-strand hamstring graft would provide a graft with significantly larger diameter than the conventional 4-strand graft.

Methods: A retrospective review of all patients in our department with arthroscopic-assisted single bundle anterior cruciate ligament reconstruction using hamstring autograft from 1 July 2020 to 31 March 2021. Intra-operatively after graft preparation, if the diameter of the 4-strand graft was < 8 mm, it would be prepared into a 5-strand graft, with subsequent 'all-inside' reconstruction technique using suspensory fixations on both the femoral and tibial tunnels to make up for the shorter graft length.

Results: 22 Patients were included into the study. The mean graft diameter of the 5-strand graft was 8.9 ± 0.6 mm. The mean increase in graft size from a 4-strand graft was 1.6 ± 0.4 mm. Quadrupled graft diameter was significantly correlated with patient's weight and BMI.

Discussion and Conclusion: The 5-strand hamstring autograft provides a significant larger graft diameter compared with 4-strand graft in anterior cruciate ligament reconstruction.

FP10.3

Clinical outcomes of subacromial balloon spacer implantation for massive and irreparable rotator cuff tear

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Introduction: This prospective study was to assess the effect of pain relief and functional outcomes in patients with massive irreparable rotator cuff tear treated with implantation of a biodegradable subacromial spacer.

Methods: From June 2017 to August 2020, 8 patients with symptomatic massive irreparable cuff tears were managed with arthroscopic debridement and implantation of a biodegradable subacromial spacer and were followed up for at least 1 year (12-30 months). Outcome measures included pre and postoperative shoulder range of motion, VAS pain score, UCLA and Constant scores.

Results: Eight patients, five males and three females were included in the study. The average age of the patients was 72.5 years. At the last follow-up, the mean shoulder range of motion was increased with forward flexion from 100 to 160 degrees and abduction from 90 to 150 degrees. The mean VAS pain score improved from 7.4 to 1.2. The mean UCLA score improved from 20.5 preoperatively to 30.6 postoperatively. The Constant score also improved significantly from 40.5 (35-50) preoperatively to 80.4 (70-85) postoperatively. One revision case had migration of spacer that need another operation to remove. There were no other complications like infection, synovitis, neurovascular injury etc.

Discussion and Conclusion: Arthroscopic implantation of subacromial balloon spacer in patients with massive irreparable cuff tear is a simple, quick and safe procedure with favourable pain relief and clinical outcome at a short-term follow-up.

FP10.4

The effect of supervised exercise programme and home-based exercise programme on shoulder function in older adults

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Introduction: Ageing is a risk factor for poor shoulder function. More than 30% of people older than 65 years old reported poor shoulder function. Although Alsubheen et al (2020) reported that exercises that improve shoulder muscle strength and flexibility are effective in enhancing shoulder function, older adults often show low adherence to exercise. In this study, we investigate the effect of supervised exercise programme and home-based exercise programme on shoulder function in older adults.

Methods: Subjects were recruited from three local elderly centres. Participants from two centres were allocated to supervised exercise group conducted by a qualified sports trainer and the participants from another centre were assigned to home-based exercise group. Ultrasound measurement of subacromial space (SAS), range of motion (ROM), the peak isometric shoulder strength and SPADI were compared before and after the exercise programme.

Results: 31 subjects were recruited and 23 subjects were allocated to the supervised exercise group (mean age \pm SD: supervised group: 74.7 \pm 7.7; home-based group: 74 \pm 5.7). There were no significant differences in baseline measurement between groups. Both groups showed the significant improvement of SAS, ROM and the peak isometric strength after the intervention excepting in SPADI score ($p < 0.05$). Moreover, there were no significant differences of the group changes in all the measurements after intervention.

Discussion and Conclusion: Both supervised exercise programme and home-based exercise programme can enhance shoulder function, but had no effect on shoulder pain relief. And the effect of exercise on shoulder function did not differ between the mode of delivering the intervention.

FP10.5**The effect of whole-body vibration on dynamic knee stability at early stage after anterior cruciate ligament reconstruction**

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Introduction: Muscle deficits of quadriceps of hamstring contribute to poor dynamic knee stability after ACLR. The whole-body vibration (WBV) training has been considered as an effective and safe method to improve muscle function after ACLR. However, its effect on dynamic knee stability is still not clear. Therefore, this study is to determine the short-term effect of an 8-week early WBV training on dynamic knee stability during single leg squats.

Methods: Eight patients with unilateral ACLR were included in this pilot study. They were randomly assigned to either the WBV or control group. Patients in the control group received conventional ACL rehabilitation, while patients in the WBV received 8 weeks of WBV training in addition to conventional rehabilitation, starting from 1 month after ACLR. Dynamic knee stability was evaluated by knee kinematics using three-dimensional knee movements (VICON) during single leg single squat tests.

Results: At 3 months after ACLR, the WBV group showed significant improvement in reducing the maximum knee valgus angle of the ACLR involved limb during single leg squat test (-7.03 ± 7.48 vs 3.73 ± 4.04 , $p=0.029$) and frequency of varus-valgus movements during the holding phase of single leg squat and hold test (-2.00 ± 0.90 vs 0.00 ± 0.54 , $p=0.029$).

Discussion and Conclusion: An 8-week WBV training starting at one month after ACLR may be effective in improving dynamic knee stability by reducing dynamic knee valgus and knee wobbling during single leg squats. We suggest incorporating the early WBV training into current post-ACLR rehabilitation programmes in order to facilitate recovery of dynamic knee stability.

FP10.6**The role of vitamin D deficiency on quadriceps muscle atrophy after anterior cruciate ligament reconstruction**

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Introduction: Quadriceps muscle atrophy after anterior cruciate ligament reconstruction (ACLR) is well documented. Athletes are one of the high-risk groups for vitamin D deficiency. Vitamin D deficiency can potentially result in decreased hypertrophy in response to rehabilitation, leading to a poorer outcome. Vitamin D has been recognised for its effect on musculoskeletal health. The aim of the study is to determine the role of vitamin D deficiencies on quadriceps muscle atrophy in ACLR patients.

Methods: Vitamin D levels were measured in patients after ACLR. Patients undergoing a unilateral ACLR with hamstring graft were recruited for the study. Quadriceps thicknesses and isokinetic strengths were recorded. Blood samples for the 25-OH vitamin D serum concentrations were measured by ELISA. Knee function questionnaires were recorded.

Results: Sixteen participants were recruited for the study. Cluster analysis resulted in 9 non-atrophic and 7 atrophic patients, 30% strength deficits were observed in the atrophy group and 20% strength deficits were observed in the non-atrophy group. 68% of the patients were found to have vitamin D insufficiencies with levels below 30 ng/ml, 56% had deficiencies with levels below 20 ng/ml. Patients with vitamin D deficiency showed to have a lower quadriceps muscle thickness and lower IKDC. Regression analysis suggested that quadriceps strength in involved side and vitamin D deficiency status accounted for variations in IKDC.

Discussion and Conclusion: We demonstrated an association between vitamin D deficiencies and quadriceps muscle atrophy with lower IKDC in ACLR patients. These data may support the role vitamin D supplementation to enhance functional recovery in ACLR.

FP10.7

Surgical management of unstable distal clavicle fracture: arthroscopic suture button fixation versus open fixation

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Introduction: Most unstable distal clavicle fractures are treated surgically because of high non-union rate when treated non-operatively. Traditionally the fracture is fixed in open manner by various means including locking plate, hook plate, suture fixation, etc. Arthroscopic-assisted suture button fixation is gaining popularity with the advantage of smaller incision and less implant related complication.

Methods: From 2011 to 2020, there were 26 cases of distal clavicle fractures treated surgically in our institution. 13 patients were treated with open fixation while 13 patients were treated with arthroscopic-assisted suture button fixation. Background demographic, functional and radiological outcomes were assessed.

Results: Mean follow-up period was 17.2 months in open group and 9.8 months in arthroscopic suture button group. There were no statistically significant differences in patient's demographic data, Constant Murley score (97.3 ± 3.0 vs 95 ± 4.2), UCLA score (34.2 ± 1.3 vs 34.5 ± 0.8) and timing of radiological healing (21.7 ± 3.0 vs 18.5 ± 4.6 months). Arthroscopic suture button fixation yields a statistically significant smaller final coracoclavicular distance (7.9 ± 1.0 vs 9.7 ± 1.2 cm, $p=0.049$) than open fixation. There were 3 cases of delay union and 1 case of infection required surgical debridement in open group. While there was only 1 case of delay union in arthroscopic suture button group.

Discussion and Conclusion: Arthroscopic-assisted suture button fixation is safe and effective in managing unstable distal clavicle fracture functionally and radiologically.

FP10.8**Lower psychological readiness to return to sports is associated with poor dynamic knee stability on both injured and uninjured limbs after anterior cruciate ligament reconstruction****Matthew Chun Sing Chow,¹ Xin He,¹ Jihong Qiu,¹ Daniel Tik Pui Fong,² Michael Tim Yun Ong,¹ Patrick Shu Hang Yung¹**¹*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*²*National Centre for Sport and Exercise Medicine, School of Sport, Exercise and Health Sciences, Loughborough University, United Kingdom*

Introduction: Psychological readiness to return to sport (RTS) measured by Anterior Cruciate Ligament Return to Sport After Injury (ACL-RSI) scale is a predictor for RTS after ACL reconstruction. However, it has not been investigated in relation to dynamic knee. This study aimed to: (1) investigate the association between the psychological readiness to RTS and dynamic knee stability and (2) compare dynamic knee stability between patients with higher ACL-RSI scores and those with lower scores.

Methods: Twenty-nine male pivoting sports players (mean age: 25.34 ± 4.16 years) with unilateral ACL reconstruction were included. Each patient completed the ACL-RSI scale to measure the psychological readiness to RTS. During the landing phase of the single leg hop test, dynamic knee stability was evaluated by the knee biomechanics using the three-dimensional motion analysis system (VICON).

Results: ACL-RSI scores showed a moderate correlation with flexion angle at initial contact on both injured ($r=0.465$; $p=0.013$) and uninjured limb ($r=0.486$; $p=0.009$). Comparing patients with lower ACL-RSI scores (≤ 75) ($n=13$) versus patients with higher ACL-RSI scores (≥ 90) ($n=10$) showed a significant reduction in flexion angle at initial contact on both limbs in the former group (injured limb: median= 10.6 (7.85-17.1) vs 20.6 (15.3-25.3); $p=0.003$; uninjured limb: median= 11.1 (8.25-19.3) vs 19.4 (14.9-27.7); $p=0.018$).

Discussion and Conclusion: Our study showed that patients with lower psychological readiness for RTS have poorer dynamic knee stability on both injured and uninjured limbs during single-leg hop landing. The findings suggest psychological intervention in parallel with physical rehabilitation may be necessary to improve dynamic knee stability and reduce ACL re-injury risk after ACL reconstruction.

FP10.9**Quadriceps inhibition negatively affects quadriceps strength in patients with anterior cruciate ligament injuries****Jihong Qiu, Michael Tim Yun Ong, Ben Chi Yin Choi, Xin He, Bruma Sai Chuen Fu, Patrick Shu Hang Yung***Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

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FP10.10

Effect of shoulder rehabilitation exercise programme on shoulder function in older adults with diabetes

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Introduction: Around 30% of people in Hong Kong >65 years old suffered from shoulder conditions leading to functional deficits including rotator cuff pathology and arthritis. Diabetes is a risk factor for rotator cuff tendinopathy. Alsubheen et al (2020) reported that shoulder rehabilitation exercise can improve diabetic shoulder pain, but its effect on shoulder function remains unknown. In this study, we investigate the effect of shoulder exercise programmes on shoulder function in diabetic older adults.

Methods: Participants were recruited from the local elderly centre. People older than 50 years old with and without type 2 diabetes were recruited. They were invited to attend the 8-week exercise programme supervised by qualified sports trainer twice per week. Ultrasound measurement of the subacromial space (SAS), range of motion (ROM), the peak isometric shoulder strength and SPADI were compared before and after the exercise intervention.

Results: 23 subjects were recruited and 11 subjects were type 2 diabetic (mean age \pm SD: diabetics: 73.1 \pm 6.1 years; non-diabetics: 76.2 \pm 8.9 years). There were no significant differences in baseline measurement between groups. Both groups showed significant improvement of SAS, ROM and the peak isometric strength after intervention ($p < 0.05$) but no significant change in SPADI score. And no significant group differences were observed in all the measurements.

Discussion and Conclusion: Both diabetic and non-diabetic older adults can enhance their shoulder function after the exercise intervention, but there was no effect on pain relief. And the effect of this exercise programme did not differ between groups.

FP10.11

A randomised control trial to evaluate the effect of geko device (neuromuscular electrical stimulation device) on postoperative lower limb oedema in anterior cruciate ligament reconstruction patients

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Introduction: Postoperative lower limb oedema is a common sequelae of ACL reconstruction surgery and it can negatively affect patient outcome. A key aim for early postoperative period is to reduce swelling, allowing for effective rehabilitation. geko device is a neuromuscular electrical stimulation device that stimulates venous clearance. In this randomised controlled trial, the effect of geko device in reducing lower limb oedema postoperatively is evaluated by comparing to those undergoing conventional postoperative care.

Methods: 20 ACLR patients were recruited. Patients were split into two cohorts, with leg circumference measured preoperatively and on postoperation day 0, 1, 2, 5 and 15. Leg circumference is measured at 3 landmarks: "Top" (2 cm distal to the level of fibular head), "Bottom" (2 cm proximal to level of both malleoli) and "Middle" (mid-point of the two points). Knee range of motion, numeric pain rating scale and patient related outcome survey were also recorded.

Results: geko device significantly reduced lower limb oedema at "Middle" on postoperation day 1 ($p = 0.043$) and at "Top" on postoperation day 2 ($p = 0.047$) and day 5 ($p = 0.023$), suggesting that geko device predominantly reduces early-stage postoperative lower limb oedema. Reduction in leg circumference was most evident at "Top" as compared to the other two landmarks after use of geko device.

Discussion and Conclusion: geko device was shown to reduce postoperative swelling significantly and safely in early postoperative stages (Day 1-5). Reduced lower limb oedema in early postoperative stages can potentially allow for early, more effective rehabilitation exercises.

FP10.12

Community-based muscle strengthening programme may promote active lifestyle and improve sarcopenic state in community dwellers—the MusFit Cohort**Cheuk Kin Kwan,¹ Bruma Sai Chuen Fu,¹ Yuen Man Wu,¹ Ben Chi Yin Choi,¹ Michael Tim Yun Ong,¹ Jojo Jiao Jiao,² Bik Chu Chow,² Lobo Hung Tak Louie,² Sally Siu Yin Cheung,² Patrick Shu Hang Yung¹**¹*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*²*Department of Sports, Physical Education and Health, Hong Kong Baptist University*

Introduction: Sarcopenia is an increasingly recognised problem in the ageing population of Hong Kong. Our team have launched the MusFit programme in 2019, which has recruited over 300 elderly Hong Kong citizens to attend muscle strengthening exercise classes. This study aimed to evaluate the effect of the MusFit programme on the sarcopenic status of participants after 2 years.

Methods: The MusFit programme provided 6 sessions of elastic band training class over 3 months in 2019. Twenty-five female participants of a mean age of 67.2 were invited for follow-up, which 18 were diagnosed as sarcopenic before training. McNemar test was performed to assess the change in sarcopenic state of participants, while a paired *t* test or non-parametric Wilcoxon's signed rank test was performed to compare hand grip strength, gait speed, and muscle mass, quality-of life by SF-36 questionnaire, and physical activity by IPAQ questionnaire before the class and at 2 years of follow-up.

Results: One of the participants became newly sarcopenic. Seven out of 18 previously sarcopenic participants became non-sarcopenic upon follow-up. There is a significant change in sarcopenic status before training and at 2 years follow-up ($p=0.007$). Significant improvements in physical activity level were observed as increased metabolic equivalent of task per week ($p=0.03$). Significant decrease in quality of life was observed in fatigue ($p=0.007$).

Discussion and Conclusion: The MusFit programme may promote active lifestyle and improve sarcopenic state in the ageing population of Hong Kong. Community-based exercise programmes could be an effective method in tackling sarcopenia.