

B0330

The detrimental gelling effect of plate-rich plasma when exposed to human tenocytes in small diameter culture wellC.-H. Chiu^{1,2,3}, A.C.-Y. Chen^{1,2}, K.-F. Lei³¹Department of Orthopaedic Surgery, Chang Gung Memorial Hospital, Linkou, Taiwan²Bone and Joint Research Center, Chang Gung Memorial Hospital, Linkou, Taiwan³Graduate Institute of Medical Mechatronics, Chang Gung University, Taiwan

Background: Tenocytes of chronic rotator cuff tendon tears are not able to synthesize normal fibrocartilaginous extracellular matrix. Biological strategies are proposed to enhance tissue healing. Platelet-rich plasma (PRP) with different growth factors is believed to be helpful for tenocytes proliferation. Tenocytes from different age, gender of patients and passages has different characteristics. The best-fit PRP for each individual is unknown regarding the protocol of preparation, methods of activation, ratio between different growth factors and role of white blood cell. It needs large number of preparation conditions to screen the personalized best-fit PRP. Small diameter culture wells should be used to screen as much PRP preparation as possible at the same time with limited source of tenocytes from each patient. Results of tenocytes interaction with PRP in smaller culture wells may be different when compared with conventional studies using larger diameter culture wells.

Material: Human tenocytes were isolated from edge of torn human rotator cuff tendons when performing arthroscopic rotator cuff repair. First passage of tenocytes of each individual was used in the following experiment.

Method: Tenocytes were seeded in 4 different commonly used culture plates (96 well, 24 well, 12 well and 6 well) with same seeding density (2×10^4 cells/cm²). PRP was prepared and added inside each well with adjusted volume according to the diameter of each culture well. Cell proliferation was measured by WST-1 assay.

Results: Tenocytes proliferation was increased in 6 and 12 well culture plate when exposed to PRP. However, it was decreased when exposed to the same condition of PRP (well diameter adjusted) in 24 and 96 well culture plate. The culture medium in small culture wells became gel-like material after PRP was added, which may be responsible for decreased tenocytes proliferation.

Discussion: PRP can enhance tenocytes proliferation by the delivery of various growth factors and cytokines from the α -granules contained in platelets. However, the clinical benefit when applying it for augmentation during rotator cuff repair is still controversial. This may be explained by lacking of standardization of preparation protocol for each individual's best-fit PRP. To test as much preparation conditions at one time, small diameter culture wells should be used to decrease total tenocytes needed at the same experiment because tenocytes over 3 passages will show phenotypic drift, which will hinder the result of PRP research. The gelling effect of PRP was noted when they were tested in small sized culture wells, which might be detrimental to tenocytes proliferation. The phenomenon disappeared when they were tested in large diameter culture well as published articles. Above condition should be noticed when performing PRP experiment in small diameter culture wells.

Conclusion: The detrimental gelling effect to human tenocytes is noted when performing PRP experiment in small diameter culture well. This condition is avoided when using larger diameter culture wells.

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B0334

The comparative study of arthroscopically and open subpectoral tenodesis for the treatment of bicep tendonitis

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Background: The long head of the biceps tendonitis is a common pathological situation which causes shoulder pain for patients. Normally it can be treated with tenotomy or tenodesis when nonoperative measures are not effective. The tenodesis of bicep tendon can be achieved arthroscopically or open surgery. It is not clear whether arthroscopic or open biceps tenodesis has a clinical advantage.

Material and method: A prospective comparative study was designed for patients undergoing an all-arthroscopic in joint or open subpectoral biceps tenodesis. Patients undergoing a concomitant rotator cuff or labral repair were excluded. The groups were matched to age within 5 years, sex, and time to follow-up within 1 months. Time length of tenodesis surgery, amount of blood loss, early pain improvement (day 1-7 after surgery, late pain improvement (day 7-1 month), postoperative American Shoulder and Elbow Surgeons scores, and complications were evaluated.

Results: 25 patients (14 all-arthroscopic, 11 open) with an average age of 50 years (range, 45-55 years) were evaluated. There is a significant difference between two groups regarding the time length of surgery. The mean time length of arthroscopically tenodesis in joint is 25 mins (range, 20-35 mins) and that of open tenodesis is 10 mins (range, 5-18 mins). There is a significant difference between two groups regarding the blood loss. The mean amount of blood loss is 5ml (range 3-10 ml) for arthroscopically and 30ml (range, 20-50ml) for open tenodesis. There is significant difference regarding the early pain improvement between two groups. Open tenodesis shows more early pain improvement than arthroscopically. There was no significant difference in mean American Shoulder and Elbow Surgeons scores as well as the late pain improvement between the open and arthroscopic groups (90.4 vs 85.6; $P=0.36$); There were no complications in both all-arthroscopic group and open group.

Discussion: The long head of biceps tendon starts at the top of glenoid labrum and run through the tendon sheath around the intertubercular groove. Once it gets inflammation, the

arthroscopically fixation in joint still leave certain length of inflammatory tendon in the tendon sheath which might cause symptoms for the patient. Also if the tendon sheath gets inflammation, the tenodesis of biceps tendon in the joint might not have effect on the symptoms relieve because there is still a part of tendon in the tendon sheath is in motion while arm moves. However, open subpectoral tenodesis has the tendon fixed below the inferior end of tendon sheath which leave nothing in the inflammatory tendon sheath. It might be a better method to treat the biceps tendonitis with inflammation of tendon sheath.

Conclusion: Biceps tenodesis remains a reliable treatment for the long head of the biceps tenodesis. Open subpectoral biceps tenodesis takes less time than arthroscopically surgery, but with more blood loss. Patients undergoing open subpectoral tenodesis showed more early pain improvement as compared with patients undergoing an arthroscopically tenodesis. There is no significant difference regarding the late pain improvement, shoulder score and complications between two groups.

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B0335

Primary reconstruction of ACL and PMC of the knee

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Background: Combined injury of ACL (anterior cruciate ligament) and PMC (posteromedial corner) is common in acute sports injury. It is in consensus that ACL need primary reconstruction, but the treatment of acute PMC injury is controversial. Controversy lies mainly in dealing with 3 degree injury. Some advocated conservative treatment, some advocated suture repair, but reconstruction was rarely advocated. Author found that some patients had seriously damaged PMC fibrous structure. Conservative treatment can't restore ligament tension, and seriously damaged fibre could not return to normal structure by suture repair. For this kind of the special cases, primary reconstruction of PMC was necessary. ACL and PMC was primarily reconstructed, and had obtained good clinical results.

Materials: From September 2005 to June 2013, 35 cases of acute ACL and PMC injury got primary reconstruction. There were 20 male and 15 female cases. 35 cases had obvious anterior, valgus and rotational instability. The MRI revealed anterior cruciate ligament injury, medial collateral ligament injury and PMC injury. Preoperative Lysholm score was 26.3 ± 6.6 (16 ~ 72), IKDC was 28.3 ± 8.7 (18 ~ 63).

Methods: Two allograft tibialis anterior tendons was used, one for ACL reconstruction, the other for PMC reconstruction, including sMCL (superficial medial collateral ligament) and POL (posterior oblique ligament). Single bundle for ACL reconstruction was used, with RigidFix for femoral fixation, and Intrafix for tibial fixation. sMCL and POL had a common insertion in a tunnel on medial epicondyle, and two separate insertion in two tibial tunnels. Interference screws were used for ligament fixation. Clinical evaluation includes symptoms and physical signs, Lysholm and IKDC scores.

Results: ALL cases got successful operation, no infection or ligament failure was found. All patients received follow-up for 24 ~ 84 months (average 48 months). All of the knee had regained anterior, lateral and rotational stability. Valgus test in 0° and 30° flexion was negative, and Slocum test was negative. Anterior drawer test and Lachman test was negative or positive of I degree. 21 cases (60%) returned to sports as the preoperative level, 14 cases (40%) returned to sports a bit lower than the preoperative level. Terminal Lysholm score was 89.4 ± 5.1 (82 ~ 93), and IKDC was 87.2 ± 7.2 (80 ~ 94) ($P < 0.05$).

Discussion: It is in consensus that ACL need primary reconstruction, but the treatment of acute PMC injury is controversial. In clinical practice, the author strictly follow the indications for reconstructive surgery. ①Preoperative MRI showed completely torn of the medial structure with scattered fibre. ②Under arthroscopy, the medial gap widened significantly with positive dive through sign. The positive dive through sign did not disappear after ACL reconstruction. ③While opening, the medial structure was completely torn, unable to repair with suture. These particular cases need primary reconstruction to restore stability and normal function of the knee.

Conclusion: Primary reconstruction of ACL and PMC of the knee for acute sports injury can restore the knee stability. And the reconstructed PMC can protect the reconstructed ACL. It is safe and effective to reconstruct ACL and PMC with allograft tibialis anterior tendon.

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B0344

Influence of surgery timing and meniscus tear on the recovery of muscle torque after ACL reconstruction

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Background: Muscle strength, especially higher quadriceps strength, is one of the essential aspects among the multiple factors contributing to a return to sports after anterior cruciate ligament (ACL) reconstruction. However, there is only weak evidence associated with the factors affecting muscle recovery after ACL reconstruction. The purposes of this study were to evaluate the influences of duration from ACL injury to reconstruction and complicated meniscus injury. We hypothesized that delayed reconstruction and complicated meniscus injury delays the recovery of muscle strength after ACL reconstruction.

Materials and Methods: From April 2010 to March 2014, 199 consecutive double-bundle ACL reconstructions using ST grafts were performed. The inclusion criteria were primary ACL reconstruction and at least a 1 year follow-up period. The exclusion criteria were revision surgery,