Suction Irrigation Technique in Management of Infection after ACL Reconstruction

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Abstract

Background: Anterior cruciate ligament (ACL) rupture is the most frequent ligamentous injury of the knee. It is frequently injured in the young athletes performing cutting and pivoting sports, and predisposes the knee to subsequent injuries, as well as the potential for earlier onset of osteoarthritis. Arthroscopic ACL reconstruction is a common and effective method of restoring stability to the knee after injury. Overall, infection rates are low after ACL reconstruction. Different methods were used to manage the knee sepsis including open and arthroscopic debridement and lavage.

Objective: Evaluation of the suction irrigation technique in eradication of infection after ACL reconstruction.

Patients and Methods: This study involved a retrospective review of 13 male patients with infection after ACL reconstruction. All patients were subjected to arthroscopic debridement and lavage. In 9 patients (group A), suction and irrigation were added in the internal ward for 1-4 days (average 3 days). The results were compared to those managed without suction irrigation (group B), regarding time used for eradication of infection, final knee range of motion (ROM), pain, and swelling.

Results: Group A patients showed rapid regression of symptoms and signs rather than group B, but with relatively longer hospital stay.

Conclusion: Suction irrigation technique is an effective method for eradication of infection after ACL reconstruction, however it showed minimal significant superiority over arthroscopic debridement alone.

Key Words: ACL reconstruction – Knee sepsis – Arthroscopic knee lavage – Knee suction irrigation.

Introduction

ARTHROSCOPIC anterior cruciate ligament (ACL) reconstruction is an effective method of restoring stability to the knee after injury to the ACL [1,2]. Postoperative septic arthritis is an uncommon but potentially serious complication with a reported incidence rate between 1.3% and 1.7% [3-6]. The functional outcomes after eradication of postoperative infection have been variable. This report reviewed 13 cases with postoperative ACL reconstruction infections and evaluated the addition of continuous suction irrigation to the arthroscopic debridement and lavage [2,7,8].

Patients and Methods

A retrospective review was established for reported cases of infection after ACL reconstructions (13 cases out of 290 cases) performed at our hospitals from January 2015 to August 2016.

Diagnosis:

Diagnosis of infection was based upon both clinical suspicion and laboratory confirmation. Infection was suspected with swollen and tender knee, and with limited ROM. Persistent wound discharge after surgery was also considered infected until proved otherwise.

Infection was confirmed by elevated ESR, CRP, together with positive culture from a knee aspiration. Patients’ sheets were evaluated for age, gender, graft type, associated knee injuries, and systemic comorbidities including diabetes, smoking, renal or hepatic problems.

The study included 13 male patients between 21 & 42 years old (average 32 years), 3 patients (23%) were non-insulin dependent diabetics, 4 patients (30.8%) were smokers, with no other renal or hepatic problems. In all patients, ACL was reconstructed by hamstring grafts (semitendinosus & gracilis). 4 patients (30.8%) had an associated medial meniscus injury, 4 others (30.8%) had lateral meniscus injury, and 5 patients (38.4%) had an isolated ACL tear. All associated injuries are managed at time of ACL reconstruction.
Concerning the onset of symptoms, only one patient (7.7%) presented within the 1st week after surgery, while 6 patients (46.2%) had the clinical signs of infection within the 2nd week, and the other 6 patients (46.2%) within the 3rd week post-operatively. All patients were feverish with variable degrees of temperature ranging from 37.5°C to 40°C (average 38.3°C).

Management techniques:
The patient was admitted to the hospital on the same day of the presented infection. ESR and CRP were evaluated, and a culture was studied from the wound discharge and aspirated fluid. All patients received 2gm IV 3rd generation cephalosporin every 12 hours, then antibiotic was modified according to culture and sensitivity. Staphelococcus aureus was the causative organism in all cases.

In the same day of admission the arthroscopic debridement and lavage was performed in all patients. 4 patients needed arthroscopic debridement twice, and single arthroscopic debridement was enough for 9 patients. Arthroscopic lavage was performed using 10-15 liters of normal saline (sodium chloride 0.9g/dl) with garamycin and tranexemic acid (2 ampoules each).

The patient were divided to 2 groups, we added suction irrigation to group A (9 patients), while the other 4 patients (group B) were managed by arthroscopic debridement and lavage only.

The arthroscopic debridement and lavage was followed by suction irrigation technique in the patients of group A only, while Group B was treated only by arthroscopic debridement and lavage.

Suction irrigation technique:
1- In the operating room, and after arthroscopic debridement and lavage, two plastic tubes (16mm) were applied, one is connected to an irrigator apparatus and the other is connected to the suction drain, through two separate portal in the suprapatellar pouch or the same arthroscopic portals, and continues the process in the internal ward.

2- Normal saline was used for the irrigation as a continuous drip through the 24 hours to avoid blocking of the suction tube by the clotted blood and the tissue debris. Rate of irrigation was 60-90 droplets/min. Garamycin 80mg ampoule was added to the irrigator every 6 hours.

3- The suction bottle was evacuated regularly.

4- The irrigator was stopped 1 day after restoration of normal body temperature and draining a clear fluid.

5- The suction drain was removed 24 hours after stopping of the irrigator.

The graft was assessed during the arthroscopic debridement, and it was removed if found to be necrotic or unstable.

The patients were followed-up clinically, and by ESR & CRP. IV antibiotics were continued for 1 week then oral antibiotics according to culture and sensitivity were started for 6 weeks. CRP and physical examination were repeated 1 week after discontinuity of antibiotics and knee range of motion was measured. Infection was considered eradicated when ESR and CRP came back to normal and there was no swelling, no fever, and painless knee ROM. Patients were followed-up to a minimum of 4 months.

We compared the final records of ESR, CRP, hospital stay, time used for resolution of symptoms, the need to a second arthroscopic debridement, and when the patient returned to work. These records were used to compare between group A and group B.

Results
We reviewed the charts of patients with ACL reconstruction in our hospitals, in the period between January 2015 & August 2016. We found 13 out of 290 patients (4.48%) developed postoperative infection.

In group A patients, the ESR took from 11-27 days to come back to normal (average 16 days), the CRP became normal after 7-20 days (average 11 days), swelling disappeared after 3-13 days (average 5.1 days), while the body temperature was normal after 1-3 days from admission (average 2 days) (Fig. 1).

In group B patients, the ESR took from 12-37 days to come back to normal (average 20.25 days), the CRP became normal after 7-22 days (average 12.5 days), swelling disappeared after 0-15 days (average 6.25 days), while the body temperature was normal after 1-3 days from admission (average 2.25 days).

Regarding knee ROM, in group A the average ROM regained after 4 months was 107.8° ranging from (90°-120°) starting from 0° extension, while in group B the average ROM regained was 96.25° ranging from (40°-120°) as shown (Fig. 2).

All diabetic patients (3 patients, 1 in group A & 2 in group B) showed no return to normal knee ROM, 2 of them showed flexion deformity of 30°
and $^\circ$, and the 3rd patient showed knee ROM ranging from $0^\circ$ to $100^\circ$.

Regarding days of hospital stay, group A patients had an average of (4.33 days) ranging from 3 to 7 days, while in group B patients had an average of (2.5 days) ranging from 1 to 7 days (Fig. 3). The graft was removed in one patient in group A, and in 2 patients in group B.

Discussion

International studies showed infection rate after ACL reconstruction ranged between 0.14%-1.7% [3-6]. This infection rate was lower than ours which was 4.48%. Many earlier researchers have shown bad results for patients suffering postoperative septic arthritis after ACL reconstruction [3-6,8].

Schulz et al., also showed a bad result in his study in 24 patients with septic arthritis after ACL reconstruction, his protocol was arthroscopic debridement and lavage and/or subtotal synovectomy through arthrotomy, he did not use the suction irrigation technique. 15 grafts were taken out in his study. In contrast to our study, this patient had poorer clinical results [9].

However, not all authors showed inferior functions after infection. Viola et al., reevaluated 14 knees on average 14.4 months after septic arthritis after ACL reconstruction, the results were better than those of earlier reports [10].

This study confirmed that the infection can be controlled without taking out the graft, although the possibility of keeping the graft with eradication of the infection was also reported in the literature using correct antibiotics, and repeated arthroscopic lavage and debridement [1,2,6,7,11-14].

Suction irrigation technique in the internal ward could shorten the duration taken to be back to normal. However, regarding the hospital stay, patients of the group A were admitted for a longer duration.

There was no distinct data about criteria upon which the patients were managed by suction irrigation or not. Despite the apparent shorter duration taken for regression of symptoms and signs, the statistical analysis of these data showed a weak significance and an increased in the standard deviation.

Conclusion:

Suction irrigation is an effective technique in eradication of infection after ACL reconstruction, regarding rapid regression of symptoms and decrease of ESR & CRP back to normal. However, further metaanalysis and prospective comparative study is needed to significantly evaluate the procedure.

References

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جذوى استخدام تقنية الريء والضغط المستمر في علاج الالتهابات الصدية الناتجة بعد عملية إعادة بناء الريض الصليبي الأمامي للركبة

يتعرض الريض الصليبي الأمامي للركبة كثيراً للإصابة والقحة، وغالبًا ما تحدث الإصابات في الرياضيين الشابين الذين يمارسون الرياضات التي تتطلب تغيير مفاصل في الاتصالات مما يعرض الريض للإصابة المتكررة. هذه بالإضافة إلى تعرضهم لدخول في مفصل الريض في مراحل سنية متقدمة.

عملية إعادة بناء الريض الصليبي الأمامي عملية شائعة وفعالة لإعادة الاتزان للركبة بعد قطع الريض الصليبي الأمامي. ولكن قد ينتج عنها بعد المشكلات المصاحبة مثل العودة البكتيرية، والتي تزداد نسبتها في أحيانات الدراسات المختلفة من 11.7% - 16.7%، وتتم معالجتها بطرق مختلفة.

قام هذا البحث بدراسة فاعلية وجودة استخدام تقنية الريء والضغط المستمر في غسيل الريض في علاج الإصابة بالعوين الصديبية بعد جراحة إعادة بناء الريض الصليبي الأمامي للركبة. قامت الدراسة على 12 مريض تعرضوا للإصابة البكتيرية من إجمالي 190 مريض. تم تقسيم المرضى إلى مجموعتين، المجموعة الأولى (أ) - تشمل 9 حالات لم تكن إجراءت تقنية الريء والضغط المستمر عليهم، والمجموعة الثانية (ب) لا تشتمل 4 حالات لم علاجهم بناء هذه التقنية.

تم دراسة تأثير بعض العوامل على نتائج علاج المجموعتين مثل مدة الإقامة بالمستشفى، الارتفاع في درجة الحرارة وتورم الركبة، ارتفاع سرعة ترسيب كرات الدم الحمراء والبروتين النشط بالدم، ودرجة تأثر مدى الحركي للركبة في المجموعتين.

وقد أظهرت نتائج الدراسات تمييز المجموعة الأولى (أ) عن المجموعة (ب) بسرعة الاستجابة للعلاج من حيث سرعة هبوط درجة حرارة الجسم، واستجابة التورم، وتوزع مستوي سرعة ترسيب كرات الدم الحمراء والبروتين النشط بالدم، وتحسين مدى الحركي للركبة. ولكن في المقابل تمتزج المجموعة (ب) عن المجموعة (أ) بقصر فترة إقامة المريض بالمستشفى.

وقد دفعها زيادة الانحراف المعياري للبحث التوصية بعمل تحليل توالى والتحرية لدراسات بحثية أخرى لدراسة مدى دلالة تأثير تلك العوامل مع عوامل أخرى على مدى الحركي النهائي للركبة.

ويجب أنه يمكن القول بأن يمكن التوصية باستخدام تقنية الريء والضغط المستمر في علاج العوين الصديبية بعد عملية إعادة بناء الريض الصليبي الأمامي للركبة.