

Post-arthroscopy Tuberculosis of the Knee Joint: An Analysis of Incidence, Presentation, Diagnosis and Treatment Outcome

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Abstract: Introduction: Tuberculosis of the knee joint is not very much common. It is the third highest affected site after spine and hip in osteoarticular tuberculosis. Diagnosis of TB knee is difficult because the clinical features are not typical. Ligaments reconstruction, meniscus surgery and many other procedures can successfully be done by arthroscopy in knee joint. Aim of the study: The aim of this study was to evaluate the incidence, clinical and laboratory findings and assess the treatment outcome of post arthroscopy MTB infections of the knee joint. Methods: This cross-sectional study was conducted in Ibn Sina Knee Centre, Dhaka and Northern International Medical College Hospital, Dhaka, Bangladesh during the period from February 2015 to January 2020. Purposive sampling technique used in the selection of the study patients. Somehow we selected 7 patients for the study with unusual presentations of night cries after arthroscopic procedures. Statistical data were analysed by MS-Excel 2016. Result: We describe 7 cases of isolated MTB infection after arthroscopic procedures in immuno-competent patients as study people for our inquiry. Almost all the study patients 6 (85.71%) treated by anti- TB drugs and 1 (14.29%) treated with MDR-TB drug. Almost all patients 6 (85.71%) had gain excellent results and 1 (14.29%) had good results. So we found a satisfactory result in the post arthroscopy tuberculosis of the knee joint with this treatment. Conclusion: We found Mycobacterium Tuberculosis (MTB) infection as a complication after arthroscopic procedures like anterior cruciate ligament (ACL) reconstruction and or meniscus surgery of the knee joint.

Keywords: Post-arthroscopy, Anterior Cruciate Ligament (ACL), Septic Arthritis, Mycobacterium Tuberculosis (MTB), TB Knee

1. Introduction

Tuberculosis of the knee joint is not very much common. It is the third highest affected site after spine and hip in osteoarticular tuberculosis. It is about 10% of all skeletal tuberculosis. Diagnosis of TB knee is difficult because the clinical features are not typical. Ligaments reconstruction,

meniscus surgery and many other procedures can successfully be done by arthroscopy in knee joint. Arthroscopic anterior cruciate ligament (ACL) reconstruction has been successfully used for restoring knee stability in ACL injury [1-3]. Septic arthritis is an uncommon but potentially devastating complication of peri- and intra-articular surgical procedures (including arthroscopy), estimated to occur in less

than 1% of patients undergoing arthroscopically anterior cruciate ligament (ACL) reconstruction surgery [4-18]. Currently, septic arthritis after ACL reconstruction is classified as acute when it occurs within 2 weeks from surgery, subacute when it is diagnosed between 2 weeks to 2 months after surgery and late when it is diagnosed more than 2 months postoperatively [13, 16-18]. The incidence of septic arthritis after this procedure by use of an auto-graft is rare and has been reported to be between 0.14% and 1.7% [1-3, 19-21]. The WHO South-East Asia (SEA) Region is home to 26% of the world's population with 44% burden of Mycobacterium Tuberculosis (MTB) incidence. In 2017, an estimated 4.4 million people fell ill with MTB and estimated 638 000 died because of the disease which is more than half of global MTB deaths. Treatment success for new and relapse MTB cases was 75% (for those initiated on treatment in 2016), amongst the lowest in the Regions of the world. It is also estimated that 192000 Rifampicin-resistant (RR) and multi-drug-resistant MTB (MDR-TB) cases accounting for more than 34% of global burden appeared in the Region in 2017, of which less than 52 000 were notified in the same year. Six out of the 30 high MTB (and MDR-TB) burden countries are in the SEA Region: Bangladesh, Democratic People's Republic of Korea, India, Indonesia, Myanmar and Thailand [22]. Hence we decided to investigate our patients with post arthroscopy septic arthritis with unusual presentations of the knee like night cries or knee swelling after ACL reconstructions and or meniscal procedures to assess the presence of this organism [23]. The study aims to share our experience, evaluate the incidence, clinical and laboratory findings and assess the treatment outcome of post arthroscopy MTB infections of the knee joint.

2. Objectives

- a. General objective
 1. To evaluate the incidence, clinical and laboratory findings and assess the treatment outcome of post arthroscopy MTB infections of the knee joint.
- b. Specific Objectives
 1. To identify the demographic data of post arthroscopy MTB infections of the knee joint.
 2. To describe clinical and laboratory findings of post arthroscopy MTB infections of the knee joint.
 3. To observe the management and outcome of post arthroscopy MTB infections of the knee joint.

3. Methodology & Materials

It was a prospective study and was conducted in the Ibn Sina Knee centre, Dhaka and Northern International Medical College Hospital, Dhaka, Bangladesh during the period from February 2015 to January 2020. We performed 1520 arthroscopic procedures (Arthroscopic ACL reconstruction with quadrupled hamstring auto-grafts and associated meniscus surgery in some cases). Patients with only isolated tuberculosis infection were considered in this study.

Diagnostic criteria for septic arthritis due to MTB are: (1) positive stain for acid-fast bacilli (AFB) in joint samples, (2) a positive culture on Löwenstein-Jensen medium, (3) epithelioid granuloma with or without central caseation and Langhans-type giant cells at the histologic analysis of synovial tissue, and (4) Positive polymerase chain reaction (PCR) [24]. Purposely selected 7 patients for this study who developed unusual pain in the operated knee especially night cries and knee swelling few weeks after surgery. There was no improvement of those symptoms with the traditional treatment. On the basis of clinical suspicion, we investigated those patients for diagnosis. One patient found by positive Montoux Test (MT) and with ESR 90mm, one patient by PCR, by synovial biopsy we identified 2 patients and another 3 patients identified by the symptoms on clinical experience. All patients treated by anti-TB drugs except one who needed MDR-TB drug. We continued the anti-TB combination chemotherapy for total 18 months in all patients and followed up for two years. Outcome of the patients after treatment were analysed by using Matta et al analysis. The strategies for medical and surgical therapy of MTB infection after arthroscopy are not standardized and management decisions were made by treating surgeons. Statistical analysis ran by using MS-Excel 2016.

4. Result

We describe 7 cases of isolated MTB infection after arthroscopic procedures in immuno-competent patients as study people for our inquiry. From the demographic chart of the patients we found 2 (28.57%) male in both 20-30 and 31-40 age group of the study people and 1 (14.29%) in 41-50 age group. Then 1 (14.29%) female patients in both 20-30 and 41-50 age group of the study people but there found 0 female respondent in 31-40 age [Table 1]. We found some unusual symptoms few weeks after surgery in those patients. All 7 (100%) patients had night cries, 6 (85.71%) had loss of appetite, 5 (71.43%) in mild Fever, 4 (57.14%) found in both night sweats and weight loss [Table 2]. From the laboratory diagnosis we found 1 (14.29%) patient Montoux test positive and ESR 90mm, 1 (14.29%) by PCR 2 (28.57%) found by synovial biopsy and others 3 (42.86%) identified by symptoms [Table 3]. Almost all the study patients 6 (85.71%) treated by anti- TB drugs and 1 (14.29%) treated with Multi-drug Resistant (MDR) drug [Figure 1]. Almost all patients 6 (85.71%) had gain excellent results and 1 (14.29%) had good results [Figure 2]. So there found a satisfactory result in the post arthroscopy tuberculosis of the knee joint with this treatment.

Table 1. Demographic chart of the patients (N=7).

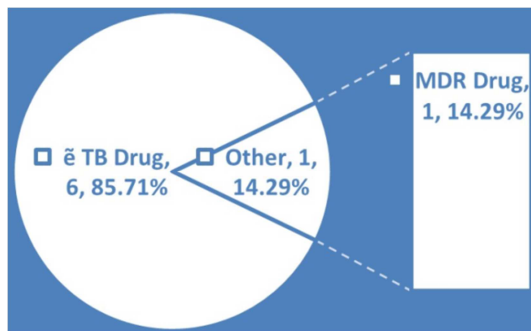
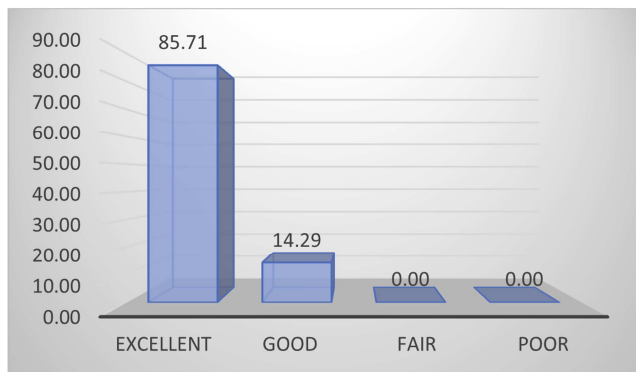
Age	Male		Female	
	n	%	n	%
20-30	2	28.57	1	14.29
31-40	2	28.57	0	0.00
41-50	1	14.29	1	14.29

Table 2. Distribute the study people based on the symptoms of MTB (N=7).

Symptoms	n	%
Fever	5	71.43
Night cries	7	100.00
Loss of appetite	6	85.71
Night sweats	4	57.14
weight loss	4	57.14

Table 3. Find out the MTB patients from laboratory test (N=7).

Laboratory diagnosis	n	%
Montoux Test+ ESR 90	1	14.29
PCR	1	14.29
Synovial Biopsy	2	28.57
None (Clinically)	3	42.86

**Figure 1.** Management of the study patients with MTB drugs (N=7).**Figure 2.** Outcome of the study patients after treatment (N=7).

5. Discussion

Organisms commonly reported in the literature in patients with septic arthritis after arthroscopy include *S aureus*, *S epidermidis*, *Peptostreptococcus*, and *enterobacter* [1-3, 18-19]. Other have reported methicillin resistant *Staphylococcus aureus*, *erysipelotheix rhusiopathiae*, *Propionibacteriaceae*, *veillonella parvula*, and *Clostridium perfringens* [23-25]. About 80% of people in many Asian and African countries tuberculin test positive but only 10% are symptomatic [21]. At the age of 40-50 years almost 100% of the population of our country infected by TB and 90% of them will not develop TB disease [22]. So, any TB infected asymptomatic patient may become symptomatic after any surgical intervention or MTB organisms may be implanted into the patient during the procedures. That may be the explanation of post arthroscopy. Tuberculous infection of the knee joint in a

pre-operative asymptomatic patient. We describe 7 cases of isolated MTB infection after arthroscopic procedures in immuno-competent patients as study people for our inquiry. Another study in India they describe 8 cases for their study [21]. From the demographic chart of the patients we found 2 (28.57%) male in both 20-30 and 31-40 age group of the study people and 1 (14.29%) in 41-50 age group. Then 1 (14.29%) female patients in both 20-30 and 41-50 age group of the study people but there found 0 female respondent in 31-40 age. There found almost similar result in a study in 26 (2.25%) they select 8 (30%) patients [21]. We found some symptoms of MTB from there 7 (100%) patients had night cries, 6 (85.71%) had loss of appetite, 5 (71.43%) in mild Fever, 4 (57.14%) found in both night sweats and weight loss. In another study, there found the most common symptom was swelling, followed by warmth and pain. Fever was rarely seen and was of low grade [21]. Biopsy samples have been used extensively in the diagnosis of TB [29]. From our study in laboratory diagnosis we found 1 (14.29%) patient Montoux test positive and ESR 90mm, 1 (14.29%) patient by PCR, 2 (28.57%) found by synovial biopsy and others 3 (42.86%) identified clinically by symptoms. Another study they found synovial fluid aspirates were negative for staining and culture in all cases; biopsy culture was positive in 44.5% of cases. This might be due to low bacterial skeletal tuberculosis. Similar result followed in literature reports sensitivities of 77% for synovial tissue cultures [27]. Almost all the study patients 6 (85.71%) treated by anti- TB drugs and 1 (14.29%) treated with MDR drugs. Almost all patients 6 (85.71%) had gain excellent results and 1 (14.29%) had good results. So there we found a satisfactory result in the post arthroscopy tuberculosis of the knee joint with this treatment. The Lysholm score recorded in our patients at the last follow-up visit was significantly improved in comparison with the pre-treatment status. Similar findings were reported by other authors investigating the outcome on the basis of this score evaluation [4, 7-9, 11, 12, 15-17, 27, 29]. Conversely, the level of activity was markedly reduced in respect to the pre-injury status. Moreover, the Tegner score at the last follow-up visit was slightly lower in comparison with the findings of the previous studies [4, 8, 12, 16, 17, 27]. This lower activity level after septic arthritis could be explained by arthrofibrosis or cartilage damage due to the infection [2, 30].

6. Limitations of the Study

Small sample size due to slightly expensive and semi invasive modality. The study was conducted in two tertiary level hospital, hence may not represent the whole population.

7. Conclusion and Recommendations

From our study we found *Mycobacterium Tuberculosis* (MTB) infection as a complication after arthroscopic procedures like anterior cruciate ligament (ACL) reconstruction and or meniscus surgery. To our knowledge,

post-arthroscopy tuberculosis of the knee joint has not been previously reported except one. Tuberculous (TB) infection as a complication after arthroscopic procedures though rare, should be kept in mind as possible cause of lesion in immuno-competent patients in zones endemic for TB. The biggest challenge is the diagnosing TB arthritis of the knee. A high index of suspicion is necessary. An early diagnosis is essential to preserve the articular cartilage and joint space. Early, specific and adequate treatment is rewarding for maintaining good joint function. Anti-tubercular combination chemotherapy could be the mainstay of treatment to decrease the time needed to eradicate the infection, permitting the retention of the graft and reducing the time of disability. Arthroscopic debridement may be needed in some cases.

Conflict of Interest

The authors declare that they have no competing interests.

Ethical Approval

The study was approved by the Institutional Ethics Committee.

References

- [1] Williams RJ III, Laurencin, CT, Warren RF, Speciale LC, Brause BD, O'Brien S. Septic arthritis after arthroscopic anterior cruciate ligament reconstruction; Diagnosis and management. *Am J Sports Med* 1997; 25: 261-267.
- [2] McAllister DR, Parker RD, Cooper AE, Recht MP, Abate J. Outcomes of postoperative septic arthritis after anterior cruciate ligament reconstruction. *Am J Sports Med* 1999; 27: 562-570.
- [3] Tongel VA, Stuyck J, Bellemans J, Vandenuecker H. Septic arthritis after arthroscopic anterior cruciate ligament reconstruction. Retrospective analysis of incidence, management and outcomes. *Am J Sports Med* 2007; 35: 1059-1063.
- [4] Abdel-Aziz A, Radwan YA, Rizk A. Multiple arthroscopic debridement and graft retention in septic knee arthritis after ACL reconstruction: a prospective case-control study. *Int Orthop* 2014; 38: 73-82.
- [5] Barker JU, Drakos MC, Maak TG, Warren RF, Williams RJ, Allen AA. Effect of graft selection on the incidence of postoperative infection in anterior cruciate ligament reconstruction. *Am J Sports Med* 2010; 38: 281-286.
- [6] Bauer T, Boisrenoult P, Jenny J-Y. Post-arthroscopy septic arthritis: Current data and practical recommendations. *Orthop Traumatol Surg Res* 2015; 101: S347-350.
- [7] Benner RW, Shelbourne KD, Freeman H. Infections and patellar tendon ruptures after anterior cruciate ligament reconstruction: a comparison of ipsilateral and contralateral patellar tendon autografts. *Am J Sports Med* 2011; 39: 519-525.
- [8] Bostrom Windhamre H, Mikkelsen C, Forssblad M, Willberg L. Postoperative septic arthritis after anterior cruciate ligament reconstruction: does it affect the outcome? A retrospective controlled study. *Arthroscopy* 2014; 30: 1100-1109.
- [9] Judd D, Bottoni C, Kim D, Burke M, Hooker S. Infections following arthroscopic anterior cruciate ligament reconstruction. *Arthroscopy* 2005; 22: 375-384.
- [10] Maletis GB, Inacio MCS, Reynolds S, Desmond JL, Maletis MM, Funahashi TT. Incidence of postoperative anterior cruciate ligament reconstruction infections: graft choice makes a difference. *Am J Sports Med* 2013; 41: 1780-1785.
- [11] Monaco E, Maestri B, Labianca L, Speranza A, Vadalà A, Iorio R, Ferretti A. Clinical and radiological outcomes of postoperative septic arthritis after anterior cruciate ligament reconstruction. *J Orthop Sci* 2010; 15: 198-203.
- [12] Schollin-Borg M, Michaëlsson K, Rahme H. Presentation, outcome, and cause of septic arthritis after anterior cruciate ligament reconstruction: a case control study. *Arthroscopy* 2003; 19: 941-947.
- [13] Schulz AP, Götze S, Schmidt HGK, Jürgens C, Faschingbauer M. Septic arthritis of the knee after anterior cruciate ligament surgery: a stage-adapted treatment regimen. *Am J Sports Med* 2007; 35: 1064-1069.
- [14] Schuster P, Schulz M, Immendoerfer M, Mayer P, Schlumberger M, Richter J. Septic arthritis after arthroscopic anterior cruciate ligament reconstruction: evaluation of an arthroscopic graft-retaining treatment protocol. *Am J Sports Med* 2015; 43: 3005-3012.
- [15] Sonnery-Cottet B, Archbold P, Zayni R, Bortolletto J, Thauinat M, Prost T, Padua VB, Chambat P. Prevalence of septic arthritis after anterior cruciate ligament reconstruction among professional athletes. *Am J Sports Med* 2011; 39: 2371-2376.
- [16] Viola R, Marzano N, Vianello R. An unusual epidemic of Staphylococcus-negative infections involving anterior cruciate ligament reconstruction with salvage of the graft and function. *Arthroscopy* 2000; 16: 173-177.
- [17] Wang C, Ao Y, Wang J, Hu Y, Cui G, Yu J. Septic arthritis after arthroscopic anterior cruciate ligament reconstruction: a retrospective analysis of incidence, presentation, treatment, and cause. *Arthroscopy* 2009; 25: 243-249.
- [18] Indelli PF, Dillingham M, Fanton G, Schurman DJ. Septic arthritis in postoperative anterior cruciate ligament reconstruction. *Clin Orthop Relat Res* 2002: 182-188.
- [19] World Health Organization, Tuberculosis in South-East Asia Region. 31/10/2020 <https://www.who.int/bangladesh/health-topics/tuberculosis>.
- [20] Hira LN, Devdatta SN, Nataraj AR, Chandra SY. Tubercular Infection After Arthroscopic Anterior Cruciate Ligament Reconstruction. *The Journal of Arthroscopic and Related Surgery*. 25: 131-136, February 2009.
- [21] Diagnosis of TB. National Guidelines and Operational Manual for Tuberculosis Control. 5th edition. Page no: 10.
- [22] Park DY, Kim JY, Choi KU et al. Comparison of polymerase chain reaction with histopathologic features for diagnosis of tuberculosis in formalin-fixed, paraffin-embedded histologic specimens. *Arch Pathol Lab Med* 2003; 127: 326-330.

- [23] Kurokouchi K, Takahashi S, Yamada T, Yamamoto H. Methillin-resistant *Staphylococcus aureus*-induced septic arthristis after anterior cruciate ligament reconstruction. *Arthroscopy* 2008; 615-617.
- [24] Allianatos PG, Tilentzoliou AC, Koutsoukou AD. Septic arthristis caused by *Erysipelothrix rhusiopathiae* infection after arthroscopically assisted anterior cruciate ligament reconstruction. *Arthroscopy* 2003; 19: 26e.
- [25] Farooq AH, Dabke HV, Majeed MA, Carbarns NJ, Mackie IG. Clostridial wound infection following reconstruction of anterior cruciate using bone patella bone autograft, *J Coll Physoicians Surg Pak* 2007; 17: 369-370.
- [26] Titov AG, Vyshevskaya EB, Mazurenko SI, Santavirta S, Kontinen YT. Use of Polymerase chain reaction to diagnose tuberculous arthristis from joint tissues and synovial fluid. *Pathol Lab Med* 2004; 128: 205-209.
- [27] Torres-Claramunt R, Pelfort X, Erquicia J, Gil-González S, Gelber PE, Puig L, Monllau JC. Knee joint infection after ACL reconstruction: prevalence, management and functional outcomes. *Knee Surg Sports Traumatol Arthrosc* 2013; 21: 2844-2849.
- [28] Gille J, Gerlach U, Oheim R, Hintze T, Himpe B, Schultz AP. Functional outcome of septic arthritis after anterior cruciate ligament surgery. *Int Orthop* 2015; 39: 1195-1201.
- [29] Balato G, Di Donato SL, Ascione T, D'Addona A, Smeraglia F, Di Vico G, Rosa D. Knee Septic Arthritis after Arthroscopy: Incidence, Risk Factors, Functional Outcome, and Infection Eradication Rate. *Joints* 2017; 28: 107-113.
- [30] Balato G, Ascione T, Rosa D, Pagliano P, Solarino G, Moretti B, Mariconda M. Release of gentamicin from cement spacers in two-stage procedures for hip and knee prosthetic infection: an in vivo pharmacokinetic study with clinical follow-up. *J Biol Regul Homeost Agents* 2015; 29: 63-72.