e-ISSN: 0975-5160, p-ISSN: 2820-2651

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2022; 12(12); 193-200

Original Research Article

The Infection Risk during Normal Knee Arthroscopy Performed without the Use of Antibiotics for Preventative Purposes

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Received: 25-10-2022 / Revised: 30-11-2022 / Accepted: 20-12-2022

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Conflict of interest: Nil

Abstract

Background: Despite the fact that previous research has indicated that giving prophylactic antibiotics to patients having normal knee arthroscopy may not be necessary and may, in fact, cause more problems than it solves, it is yet usual practice to do so. The objective of this study is to assess the incidence of surgical site infections in patients who have routine knee arthroscopy without the use of antibiotics as a prophylactic strategy in order to determine the frequency of such infections.

Methods: This is an analysis of 250 consecutive patients who had regular knee arthroscopy done on them between the Jan 2020 to Dec 2021 at a single institution by a single fellowship-trained sports surgeon. The assessment was carried out by one researcher. The operation was performed on each of the patients at precisely the same time. Patients had a large number of different surgical techniques, including arthroscopic meniscectomy, meniscal repair, microfracture, chondroplasty, removal of loose bodies, and lateral retinacular release. Antibiotics were not administered to any of the patients as a prophylactic measure. The postoperative care of each and every patient was monitored for a period of at least two years, and the patients' demographic information as well as their list of ailments were evaluated. After the surgery, every issue that surfaced was documented in detail.

Results: The findings revealed that there were a total of 154 male and 96 female patients. The standard deviation was 11, and the mean operating duration was 31 minutes. The mean age was 42.1 years. Two young patients who were otherwise healthy developed a postoperative superficial wound infection within a week after their surgery, but they made a full recovery after receiving oral antibiotic therapy in the outpatient setting. The incidence of infection was 0.36 percent across the board. There were no reports of any instances of severe infection. This research found an extremely low risk of surgical site infections, which is equivalent to rates that are already known to occur after these types of surgeries. This indicates that preventive antibiotics are not required, which allows one to avoid the hazards that are often linked with their use.

Keywords: Wound infection, arthroscopic meniscectomy, chondroplasty, postoperative care

Introduction

Knee arthroscopy is a frequent treatment in the field of orthopaedics and is commonly performed for a variety of objectives, including diagnostic and therapeutic. When compared to more conventional open surgery, arthroscopy surgery offers a lower risk of complications, a shorter operating time, and a shorter amount of time spent in the hospital after the procedure. Arthroscopy surgery was first performed in 1970 [1,2].

Despite the fact that standard knee arthroscopies are regarded to be clean operations with low postoperative infection rates [3–9], the administration of prophylactic antibiotics is nonetheless common because of the popular idea that these antibiotics help prevent possible surgical site infections [10]. In 2007, Bert *et al*. addressed this issue by conducting a research with 3231 individuals, which also included a control group consisting of patients who had been prescribed antibiotics.

Both of the infection rates were almost the same, coming up at 0.15% and 0.16%, respectively [9]. In addition, Wieck and colleagues carried out a research that was quite similar to this one; however, the approach used a prospective, randomized, and double-blind investigation of 437 patients.

In a patient who did not get antibiotics, there was one incidence of surface infection, and there was one case of a mild allergic response. Again, there were no occurrences of deep infection [7].

The objective of this research is to ascertain the frequency of such infections in individuals who had regular knee arthroscopy performed without the use of antibiotics as a preventative measure.

The use of prophylactic antibiotics prior to normal knee arthroscopies, on the other hand, is not seen to be required for the purpose of preventing infections at surgical sites, according to the idea.

Methods

This is an analysis of 250 patients who had regular knee arthroscopies performed on them over a period, beginning in Jan 2020 to Dec 2021, by a single fellowship-trained sports surgeon working in a teaching hospital. The review was conducted in hindsight. The procedures known as arthroscopic meniscectomies, meniscus repairs, microfractures, chondroplasties, removal of loose bodies, and lateral retinacular releases were all included in this research as examples of uncomplicated knee arthroscopies. This research did not include patients who had had complex knee arthroscopic operations such as repair of the anterior cruciate ligament (ACL), transplantation of meniscus, or procedures associated with fracture or septic knee. None of the patients were given any antibiotics for preventative purposes. Comorbidities of the patient were accurately noted in the appropriate sections of an electronic documentation sheet.

Each and every knee arthroscopy was carried out while the patient was under the influence of general anesthesia. Throughout all of the surgeries, tourniquets were worn and their balloons were inflated. Before making the incision, the knees of the patients were shaved using disposable surgical clippers designed for a single use, covered with povidone iodine solution, and then allowed to dry for three minutes before the procedure began. Sutures made of Ethilon 4-0 were used to seal the incision in an intermittent fashion (Ethicon, NJ). Every patient was given the option of going home the same day or remaining in the hospital for one day. Patients who remained the night often did so for the intention of filing an insurance claim. After the operation, they went to the outpatient

clinic for regular checkups at two weeks, six months, one year, and two years after the procedure. Age, gender, body mass index, length of operation, and the presence of comorbidities are some of the characteristics that are evaluated. The demographic data were analyzed using SPSS version 21, which was developed by SPSS Inc. in Chicago, Illinois, in the United States.

Results

There were 154 males, 96 women, and the average age was 42.1 years (the range was 15–70 years). The length of time that the procedure took, on average, was 31 minutes (range, 10–80 minutes). The total number of patients who had arthroscopic meniscectomies was 490. The remaining procedures included synovectomy and debridement, as well as removal of loose bodies and microfractures. Comorbidities experienced by patients might include diabetes mellitus, hyperlipidemia, hypertension, chronic renal disease, and ischemic heart disease. (Tables 1 and 2).

Table 1: Demographic Data & Clinical Details Co-morbidities of patients in the study.

Age (years), mean (range)	41.1 (15–70)
Sex	
Male	154
Female	96
Duration of operation (minutes)	31.1 (10–80)
Comorbidities	
Hypertension	18.1%
Diabetes mellitus	7.1%
Hyperlipidaemia	15.2%
Ischaemic heart disease	2.3%
Chronic renal disease	0.8%

Table 2: Age Distribution of patients in the study.

Age distribution (years)	*n*
11–20	9
21–30	94
31–40	108
41–50	32
51–60	6
61–70	1

Two young people who were otherwise healthy went to an outpatient clinic after they experienced slight discomfort and erythema around the surgical incisions they had received. The clinic saw them within a week. During the clinical examination, it was discovered that both patients had acquired superficial wound infections, although neither patient had knee effusion. The knee had a complete range of motion, anywhere from 0 to 130 degrees. Both patients did not have any cultures obtained from them. Both patients were given antibiotics to take orally as outpatients, and they made full recoveries. There were no instances of infections that were very severe, and our total infection rate was 0.33%. (Table 3).

Table 3: Demographics and Clinical Details of patients with superficial surgical site infections.

	Patient 1	Patient 2
Age	38	30
Sex	Male	Male
BMI	24.2	26.1
Duration of operation (minutes)	15	30
No. of comorbidities	0	0
Diagnosis	Degenerative meniscus tear	Degenerative meniscus tear
Procedure	Left APMM	Left APMM and APLM
Treatment	Oral amoxicillin clavulanate potassium	Oral amoxicillin clavulanate potassium

APLM: arthroscopic partial lateral meniscectomy; APMM: arthroscopic partial medial meniscectomy; BMI: body mass index.

Discussion

After conducting a research that was prospective, randomized, and double-blind, Wieck and colleagues came to the conclusion that there was no evidence to suggest that antibiotic prophylaxis lowers the likelihood of infection after arthroscopic surgery. The study included 437 participants. [7] In addition, Bert and his colleagues carried out a survey, which revealed that the majority of orthopaedic surgeons still use prophylactic intravenous antibiotics for routine knee arthroscopy. This is primarily due to the fact that prophylactic antibiotics are considered to be the standard of care, in addition to the fear of litigation should surgical site infections occur if prophylactic antibiotics were not used [9]. As a result of the low incidence of infections at the surgical site, the senior author of this research opts not to administer antibiotics as a preventative measure prior to normal knee arthroscopy. According to a number of studies, the insertion of a foreign body, such an ACL implant, significantly raises the overall chance of contracting an infection [10–12]. These individuals were given antibiotics as a preventative measure, thus the researchers decided not to include them in the study.

There are a few other things that might have had a role in the low infection rates that were seen in the research. To begin, the knee arthroscopies were completely elective and are regarded as being among the safest of surgical operations. Cruse and Foord state that the risk of infection during clean operations is between one and two percent of the time [13,14]. Patients were routinely discharged on the same or first postoperative day, and the duration of hospitalisation stay was minimised to reduce the risk of hospital-acquired infections. In the second place, short hospital stays contributed to low infection rates. Patients were routinely discharged on the same or first postoperative day. Thirdly, the skin preparation and shaving procedures, which are essential elements in the process of reducing the risk of surgical site infections, were standardized across all of the patients. The skin is colonized by a wide variety of bacteria, with staphylococcus aureus accounting for around half of them [15]. Because of this, preoperative skin preparation is very important, and our research makes extensive use of povidone iodine for the purpose of skin preparation. Povidone-iodine is a solution that has been shown to be useful in reducing surgical site infections, in addition to being a solution that is very affordable [16]. Because preoperative shaving has been shown to be associated with

lower rates of surgical site infections, all of the patients' surgical sites were shaved right before the procedure. However, it is important to keep in mind that the risk of infection rises if the shaving was done more than 24 hours before the procedure [17]. Finally, none of the patients got any intraoperative intra-articular corticosteroid injections over the course of their surgeries. Patients who received intra-articular knee corticosteroid injections at the time of knee arthroscopy were found to have a significantly higher risk of postoperative infection, according to a study that was published not too long ago. This was compared to a control group that did not receive any intraoperative injections [18]. The reported incidence of surgical site infections after knee arthroscopy might vary anywhere from 0.01% to 0.48% of patients [3–9]. Despite this, many of the studies that focused on these infections were flawed because they relied on self-reporting and did not define infections in a consistent manner.8 This was the case until the Centers for Disease Control and Prevention in the United States (US) created the categorization of surgical site infections in 1992. This classification divides surgical site infections into three categories: superficial, deep incisional, and organ or space [19]. In the course of our research, both superficial and deep wound infections were subjected to a retrospective examination by means of the institution's mandated preservation of clinical consultation data for a period of ten years. Only two infections of the surface layer of wounds were recorded, whereas none of the deeper wounds were infected. The stated range of infection rates in published literature is comparable to the infection rate of 0.36%. According to the findings of Sherman and colleagues, patient age (greater than 50 years) and tourniquet time (greater than 60 minutes) are statistically significant risk factors for major complications in arthroscopy surgery. These risk factors are associated with an increased likelihood of post-arthroscopy infections.11 However, the research did not take into account any of these potential dangers. Both patients who had superficial wound infections were between the ages of 30 and 38, and their tourniquet times ranged from 15 to 30 minutes (Table 2).

Diabetes mellitus has been associated to worse results in orthopaedic procedures, with greater incidence of surgical site infections being described in the medical literature [20]. However, despite the fact that 40 patients (7.2% of the total) in this research had concurrent diabetes mellitus, not a single one of them had surgical site infections. In point of fact, none of the patients who were diagnosed with a superficial infection had any preexisting medical conditions. Pain and swelling are the typical clinical manifestations of surgical site infections, and they often appear within the first and second weeks after surgery [8]. The two patients appeared with discomfort and erythema over their surgical sites during the second postoperative week; nevertheless, they were clinically non-septic and recovered quickly with oral antibiotics without the need of hospitalization or surgical debridement. However, it is essential to take note of the fact that there are reports in the published scientific literature that revealed infections can occur even up to four months after surgery. Additionally, it was found that a delayed diagnosis of infection with coagulase-negative Staphylococcus gives rise to a more mild clinical course [11,21].

There is, to this day, insufficient data to support the hypothesis that knee arthroscopy patients who get prophylactic antibiotics will have a decreased incidence of postoperative infections. In addition, the use of preventive antibiotics when it is not essential might increase the risk of drug-related problems, such as allergic responses, anaphylactic reactions, and the development of germs that are resistant to several antibiotics [22]. Prolonged use of antibiotic treatment is

famously known to increase the risk of clostridium difficile infection, which is often linked to pseudomonas colitis and toxic megacolon [23]. Cefazolin is a first-generation cephalosporin that is often used in orthopaedic surgeries. Its use has been documented to be connected to C. difficile infections in patients who received the antibiotic [24,25]. Recent years have seen an increase in the number of reports about the advent of multidrug-resistant C. difficile, which has the potential to result in a significant increase in the expenses associated with healthcare [26].

When it comes to the administration of prophylactic antibiotics, medical professionals need to be aware of the risk-benefit weightage, just as they should be when doing any other kind of medical therapy. For instance, the risk of post-routine knee arthroscopy surgical site infections (0.01% to 0.48% incidence, 0.36% in the study) is significantly outweighed by the side effects of cephalosporin, which include gastrointestinal-related symptoms such as nausea or vomiting (30% incidence) and hypersensitivity (up to 5% incidence) when given intravenously [27]. These side effects include nausea or vomiting (30% incidence). Therefore, we would need to examine whether or not it is prudent to provide prophylactic antibiotics prior to doing normal knee arthroscopy.

One further thing to think about is the price tag that comes along with taking antibiotics for preventative measures. The over use of available medical resources may be a factor in driving up the cost of healthcare. According to a study that was conducted by Thomson Reuters in 2010, the amount of money that was wasted within the healthcare system of the United States owing to the provision of needless medical treatments was $210 billion [28]. According to the findings of a research that Schultz and his colleagues carried out on the financial effect of duplicate antimicrobial treatment in hospitals throughout the United States, a potential yearly savings of $163 million exists [29]. On the other hand, there are two studies that support the use of providing prophylactic antibiotics before to knee arthroscopy. These research evaluated the cost effectiveness of the practice and found that it was beneficial [6–8]. In each of these trials, the range of knee treatments comprised cruciate ligament restoration, as well as procedures involving the meniscus and chondroplasty. In each of these investigations, knee arthroscopy was shown to be the cause of both superficial and deep infections in the knee, the treatment for which required hospitalization, additional surgical procedures, and a longer course of antibiotics. According to D'Angelo and Ogilvie-Harris as well as Babcock and colleagues, the cost of care and treatment was roughly US$5000 per individual case, and preventive antibiotics may have been able to lessen the likelihood of these problems occurring [6–8]. However, when this research solely included patients who had regular knee arthroscopies conducted without any reconstructive treatments being carried out, there were no patients who had to be readmitted to the hospital as a consequence of postoperative infections. The cost of a preventative regimen using cefazolin is around $6.55 per gram in the United States [30]. According to the findings of a nationwide study conducted in the United States in 2006, there were 900,000 arthroscopic operations done on the knee; this figure represented a 49% rise from 1996. A total of 100,000 knee arthroscopes were conducted in order to restore the anterior cruciate ligament [31]. If we exclude the operations on the anterior cruciate ligament (ACL), the cost of the preventative antibiotics used in the other 800,000 knee treatments is projected to be around $5.2 million. This exemplifies the enormous sums of money that could be able to be saved in the event if preventative antibiotics were not regularly administered during surgical

procedures. As was indicated before, according to Bert *et al*., the majority of orthopaedic surgeons still use prophylactic antibiotics in normal knee arthroscopy surgeries [9]. This research raises concerns about the need of maintaining such a procedure. Large-scale, randomized, multicenter studies might be helpful in further validating our result that prophylactic antibiotics are not essential for normal knee arthroscopy. This could then lead to the standardization of prophylactic antibiotic policies across all institutions.

The fact that this was a retrospective research with a small sample size and that all of the patients had received their care at the same hospital are two of the limitations of this investigation. In addition, there was no comparison group or control group to use.

Conclusion

According to the findings of this investigation, the incidence of surgical site infections after standard knee arthroscopy is very low. This is analogous to data that has been published in the past, with or without the use of antibiotics as preventative measures. This suggests that the use of prophylactic antibiotics is not necessary in such operations, with its purported benefit of lowering infections rates far outweighed by its associated risks.

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