



Knee arthroscopy postoperative assessment: A recent overview in Military 7A Hospital, Ho Chi Minh city, Vietnam

Quang-Tri Lê¹✉, Ngoc- Thanh Do², Huu- Hung Phan³, Minh-Hoang Nguyen⁴

¹Department of Orthopedics, 7A Military Hospital, 466 Nguyen Trai Street, Ward 8, District 5, Ho Chi Minh City, 72706, Vietnam; Email: lqtri@ntt.edu.vn; tsbstri@yahoo.com; <https://orcid.org/0000-0002-2777-0828>

²Department of Orthopedics, 7A Military Hospital, 466 Nguyen Trai Street, Ward 8, District 5, Ho Chi Minh City, 72706, Vietnam; Email: bs.dongcothanh@gmail.com

³Department of Orthopedics, 7A Military Hospital, 466 Nguyen Trai Street, Ward 8, District 5, Ho Chi Minh City, 72706, Vietnam; Email: bsphhung@gmail.com

⁴Department of Orthopedics, 7A Military Hospital, 466 Nguyen Trai Street, Ward 8, District 5, Ho Chi Minh City, 72706, Vietnam; Email: nthoang@ntt.edu.vn; bsnguyenminhhoang@yahoo.com.vn; <https://orcid.org/0000-0002-5021-669X>

✉Corresponding author

Department of Orthopedics, 7A Military Hospital, 466 Nguyen Trai Street, Ward 8, District 5, Ho Chi Minh City, 72706, Vietnam;

Email: lqtri@ntt.edu.vn; tsbstri@yahoo.com

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General Note



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ABSTRACT

Aims: This study evaluated the outcomes of knee arthroscopy in 7A Military Hospital, Hochiminh City, Viet Nam. **Methods:** This study implemented a prospective approach and was performed on 495 cases of knee arthroscopy in 7A Military Hospital, from Jun 2016 to Dec 2019. Postoperative monitor time was 6 – 18 months, and the outcome assessment was based on the Lysholm score. **Results:** Amongst the studied cases, 302 (61.01%) were anterior cruciate ligament reconstruction, 78 (15.76%) were meniscus surgeries, 43(8.69%) were anterior and posterior cruciate ligament reconstruction, 20 (4.04%) were posterior cruciate ligament reconstruction, 26 (5.25%) were osteoarthritis surgeries, 26 (5.25%) were treatment of other injuries. Postoperative outcomes were “good” in 87.14% cases, “average” in 9.09% cases, and “poor” in 3.77% cases. **Discussion:** Anterior cruciate ligament tears, meniscus rupture, and concurrent damages of both were the most common knee injuries. Most of the cases were well-treated, with the notable exception was osteoarthritis since the application of arthroscopy for degenerative knee injuries is highly controversial. These outcomes were generally agreeable with other researches. **Conclusion:** This study showed that knee arthroscopy is highly useful in the rehabilitation of knee movement.

Keywords: Knee Arthroscopy; Surgery; Rehabilitation; Knee Movement

1. INTRODUCTION

Endoscopy began in the mid-19th century with the attempts of Ludwig Türk. In 1918, knee arthroscopy was successfully applied for the first time by Kenji Takagi. Watanabe M. followed up Takagi’s work by introducing the Watanabe No. 21 arthroscope, the first practical one. Diagnostic and therapeutic arthroscopy has also been improved with the implementation of various arthroscopes and other surgical devices that enable better treatment of knee issues (Nguyen, 2009). Being a minimally invasive and safe procedure with a low complication rate, it has been one of the most extensive orthopedic surgeries worldwide (Hagino, 2014). Notably, arthroscopy-assisted reconstruction of the anterior cruciate ligament has become popular since the 1980s and 1990s and replaced the traditional arthrotomy as the gold standard. There were 100,000 ligament reconstruction cases annually in the U.S. and 30,000 cases of anterior cruciate ligament reconstruction in France. In Vietnam but there is an increasing occurrence of knee arthroscopy, although statistical data is not available yet (DO *et al.*, 2004; Jones *et al.*, 1963; Lawhorn, 2004; Nguyen, 2008; Nguyen, 2007; Nguyen 2008; Nwachukwuet *al.*, 2010).

Arthroscopy has been performed in 7A Military Hospital since 2014. Many patients have been treated, but detailed reports and assessments had yet to be made. Therefore this study aimed to remark the performed knee arthroscopy and its outcome in 7A Military Hospital.

2. MATERIALS AND METHODS

Time, place, and experimental participants

The study investigated all patients treated with knee arthroscopy in 7A Military Hospital from Jun 2016 to Dec 2019. It excluded patients with accompanying lateral ligaments which required concurrent repair or reconstruction, and patients with complicated knee joint injuries. Selection and information gathering were done based on pre-designed clinical form.

Study design

The study implemented a prospective approach.

Sample size

There were 495 selected patients investigated in this study.

Study procedures

All the studied patients went through the steps of clinical examination and conventional preoperative tests, examination with radiography and MRI on the knee joint, examination with anesthesia, endoscopic diagnosis, knee arthroscopy, postoperative care, rehabilitation, and re-examination.

Injury types and treatments

Anterior Cruciate Ligament Tear

Two-anterior-portal arthroscopy was done to diagnose the injury. Accompanying damages such as meniscus rupture were treated. Ligament auto transplantation was performed using the pesanserinus of the same leg. The tibial and femoral canals were drilled; the implant was threaded into and was fixed by the XO button and degradable interference screw or Pullup button.

Meniscus Rupture

Two-anterior-portal arthroscopy was done to diagnose the injury. Accompanying damages such as foreign bodies or cartilage/bone fragments were treated. For the rupture of the white zone (no vascularity) in the interior third (inner edge), meniscectomy was performed. For tears of the red-white zone in the medial third, a meniscal repair was performed on early admission cases and meniscectomy was performed on late admission cases. For damages of the healable red zone (dense vascularity) in the exterior third, a meniscal repair was performed.

Anterior and Posterior Cruciate Ligament Tear

Two-anterior-portal arthroscopy was done to diagnose the injury. Accompanying damages such as meniscus rupture were treated. Ligament auto transplantation was performed using the pesanserinus and peroneus longus tendon of the same leg. Two additional lateral portals were made to expose the tibial attachment site of the posterior cruciate ligament. Tibial plateau canal and femoral canal for the posterior cruciate ligament were drilled, followed by the canals for the anterior cruciate ligament. The two tendon implants were threaded and fixed by the XO button and degradable interference screw.

Osteoarthritis

Two-anterior-portal arthroscopy was done to diagnose the injury. Inflammatory synovial membrane debridement, joint capsule biopsy, and removal of ruptured bone and cartilage fragments were performed. A small artificial fracture at subchondral bone was made by drilling to stimulate fibrocartilage generation.

Mucous Knee Joint Inflammation

Two-anterior-portal arthroscopy was done to diagnose the injury. Mucus samples were inoculated for antibiotic sensitivity testing. Inflammatory synovial membrane debridement and installment of a joint washer or negative pressure drainage were performed.

Foreign Bodies or Joint Stiffness

Two-anterior-portal arthroscopy was done to diagnose the injury. Foreign bodies were removed. Fibrous tissues attached to stiffed joints were released.

Anterior Cruciate Ligament Avulsion Fracture

Two-anterior-portal arthroscopy was done to diagnose the injury. The ligament was sutured twice right at the fractured site using the Fiber Wire cord. Three bone canals were drilled, one anterior, one anterolateral, and one anteromedial compare with the ligament attachment site. The cord was threaded into the canals in an 8-shape way, one stitch went through the anterolateral and anterolateral canal each, and the remaining two stitches went through the anterior canal. Two windings were made to fix the ligament attaching site.

Posterior Cruciate Ligament Avulsion Fracture

Two-anterior-portal arthroscopy was done to diagnose the injury. Two additional lateral portals were made to expose the tibial attachment site of the posterior cruciate ligament. Two canals on the tibial plateau were drilled and the suture cord was threaded through just over the detached bone fragment. Made an 8-shaped criss-cross, each stitch went through one of the drilled canals, and then made a winding to fix the attachment site.

Repair of the Patella Medial Side

Two-anterior-portal arthroscopy was done to diagnose the injury. A stitch was made through the medial border of the patella near the apex and the base, followed by a forward move inside the medial femoral condyle and a crisscrossing tightening move beneath the skin, finally a winding to fix the patella at the correct anatomical position.

Postoperative treatments

At the end of the surgery, drainage was inserted, and the incisions were closed. The knee was supported at unbent posture. The patients then went through four-stage rehabilitation, according to D'Amato and Bach (2007).

Outcome assessment

Evaluated short-term outcomes included complications and strokes; long-term results were rated based on the Lysholm score (Lysholm and Gillquist, 1982):

Very good: 95-100 points,

Good: 84-94 points,

Average: 65-83 points,

Poor: below 65 points.

Data analysis

Collected data was processed using medical statistical method by SPSS 15.0.

Ethical declaration

The patients and relatives were well-informed of their health conditions, treatments, and unexpected complications during the surgery. The participation was strictly voluntary with the agreement of patient relatives. The study was approved by the Medicine Scientific Research Ethics Committee of the 7A Military Hospital and aimed to improve treatment (Number: 163/QĐ-HĐYĐ-BV7A, date: 25.06.2016). No discrimination and mistreatment were made on patients who refused to take part in this study. This study is original and is not published in other scientific journals.

3. RESULTS

Knee arthroscopy was performed on 495 studied patients Jun 2016 to Dec 2019 at 7A Military Hospital. The injury information was presented in Chart 1. Anterior cruciate ligament tear accounted was the most frequent injury (61.01%).

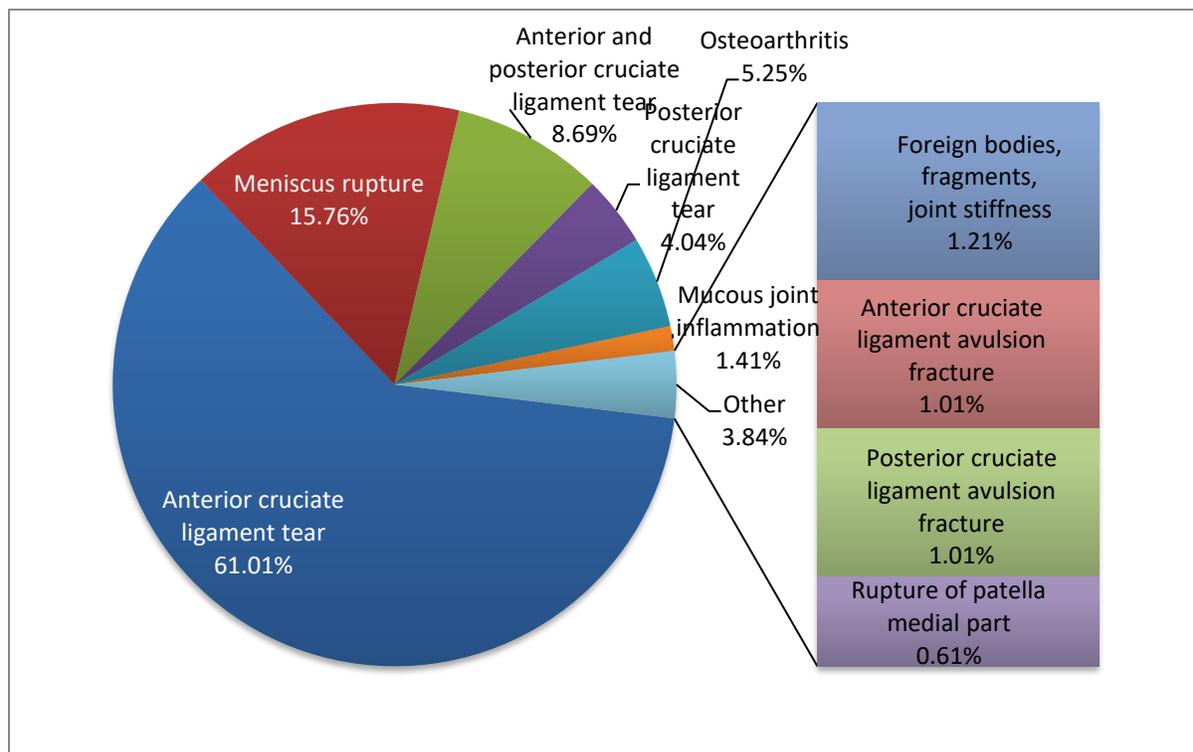


Chart 1 Patients classification based on primary injuries (n = 495)

Anterior cruciate ligament tear

Anterior cruciate ligament tear accounted for 302 cases, 217 were males (71.85%) and 85 were females (28.15%), male: female ratio was 2.6: 1. Lowest, highest, and average ages were 18, 53, and 33.16 (9.33) years, respectively. The most occurred age group was 21 to 40 years, made up of 74.8% cases. The largest causes of this injury type were traffic accidents (118 cases, 38.07%) and sports injuries (106 cases, 35.10%), followed by domestic accidents (47 cases, 15.56%) and work accidents (32 cases, 10.60%). All patients had positive Lachmann sign, 260 cases (86.09%) had positive anterior drawer test, and only 141 cases (46.69%) had a positive pivot shift test. Accompanying injuries took place in 202 cases (66.89%) in which meniscus rupture was the most common (175 cases, 57.95%), including lateral rupture (96 cases, 31.79%), medial rupture (44 cases, 14.47%) and rupture in both menisci (35 cases, 11.59%). Other injuries and issues are partial tear of the medial collateral ligament (32 cases, 10.60%) and posterior cruciate ligament (29 cases, 9.60%), damaged joint cartilage (26 cases, 8.61%) and discoid meniscus (7 cases, 2.32%). A case of anterior cruciate ligament tear MRI due to sport accident was shown in Figure 1.



Figure 1 A 28-year-old male patient with anterior cruciate ligament tear

All patients had spinal anesthesia. The total number of menisci required white zone meniscectomy and debridement were 210, occurred in 175 patients (96 with the damaged lateral meniscus, 44 with the medial meniscus, and 35 with both damaged menisci). Seventy-six patients were treated with meniscal repair. Seventeen patients with mild femoral condyle damages and seven patients with light tibial injuries had cartilage fragments debridement. Two patients with damages on both femoral and tibial condyles had fragments debridement and drilled artificial microfracture for stimulation of cartilage genesis.

All patients had ligament auto transplantation using the gracilis and semitendinosus tendons of the same leg. Lowest, highest, and average half-folded length of the orthopedics implants were 95, 120, and 104.3 (3.8) mm, respectively. Implants with a diameter of 7.5 mm, less than 7mm, and over 8mm accounted for 53.34%, 17.45%, and 29.21% of the materials, respectively. The XO buttons were used for fixation in all femoral canals and degradable interference screws in all tibial plateau canals.

Table 1 Damage location and treatment of ruptured meniscus (n = 78)

	Location			Treatment	
	Lateral meniscus	Medial meniscus	Both menisci	Meniscectomy	Meniscal repair
Left knee	19	16	9	29	15
Right knee	17	12	5	22	12
Total	36	28	14	51	27
Percentage	46.15	35.90	17.95	65.38	34.62

Meniscus rupture

Seventy-eight patients were treated for meniscus rupture. Amongst them 37 were males (47.44%), and 41 were females (52.57%), 34 had injuries in the right knee (43.59%) and 44 in the left knee (56.41%). Gender ratio and side ratio showed no difference. Injuries on lateral meniscus (46.15%) and damages treated with meniscectomy (65.38%) made up of significant proportions. The details were presented in Table 1.

Anterior and posterior cruciate ligament tear

Forty-three cases with injuries on both cruciate ligaments were treated, amongst them 27 were males (62.79%), 16 were females (37.21%), the gender ratio was 1.7 male: 1 female. Lowest, highest, and average ages were 20, 53, and 35.18 (9.22) years, respectively. The most occurred age group was 31 to 40 years, made up of 74% cases. The most significant causes of this injury type were traffic accidents (23 cases, 53.49%) and work accidents (15 cases, 34.88%), followed by sports injuries (4 cases, 9.30%) and domestic accidents (1 case, 2.33%). All patients were positive with Lachmann sign and anterior-posterior drawer test, knee loosening, instability, and conditions of subluxation. Accompanying injuries took place in 32 case (74.42%), the most common one was meniscus rupture (25 cases, 58.14%) including lateral rupture (15 cases, 34.89%), medial rupture (6 cases, 13.95%) or both (5 cases, 11.63%). Other accompanying injuries were partial tear of the medial collateral ligament (5 cases, 11.63%) and lateral collateral ligament (2 cases, 4.65%), and joint cartilage damages (1 case, 2.33%).

All patients had ligament auto transplantation using the peroneus longus, gracilis and semitendinosus tendons of the same leg. Lowest, highest and average half-folded length of the used peroneus longus tendon was 98, 130, and 112.1 (7.6) mm, respectively; of the used pesanserinus were 95, 120 and 101.2 (5.8) mm, respectively. The most frequent diameter of the used peroneus longus tendon was 8 mm (60.47%), followed by less than 7.5mm (20.93%) and over 8.5 mm (18.60%). The most frequent diameter of the used pesanserinus was 7.5 mm (53.49%), the less than 7 mm ones, and over 8 mm ones accounted for 18.60% and 30.23% of the material, respectively. For fixation in femoral canals, XO and Pullup buttons were used (81.40% and 18.60%, respectively). For fixation in tibial canals, interference screws and Pull up buttons were used (81.40% and 18.60%, respectively).

Posterior cruciate ligament tear

Twenty patients with posterior cruciate ligament tears were treated. Eight cases had posterior instability with no accompanying injuries (40.00%). Seven cases had accompanying injuries in the posterior lateral zone (35.00%) and the zone had been treated with orthopedic surgery at 4 to 6 weeks before. Three cases had accompanying medial collateral ligament damages (15.00%). Two cases had accompanying meniscus damages (10.00%). The used orthopedic implants were the pesanserinus (15 patients, 75.00%) and peroneus longus tendon (5 patients, 25.00%).

Osteoarthritis

Patients with mild damages in the femoral condyles (18 patients) and tibial condyles (8 patients) had cartilage fragments debridement. Patients with damages in both femoral and tibial condyles (2 cases) went through debridement and had artificial microfracture drilled to stimulate cartilage genesis. Patients with degenerative meniscus ruptures (10 cases) had meniscectomy, and patients with partial anterior cruciate ligament tear (4 cases) had debridement at the damaged site.

Short term postoperative outcomes

Four hundred ninety two patients (99.39%) had wound healing first stage had stitches removed after 7 – 10 days and had guided rehabilitation exercises. Three patients (0.61%) had a shallow infection at the incision for tendon harvest which required stitches removal, debridement, and strong antibiotics administration. Eight cases (1.62%) had postoperative knee effusion and required drainage. Four cases had postoperative knee effusive inflammation required arthroscopic cleaning and debridement for stabilization.

Long term postoperative outcomes

The postoperative monitor was performed on 451 patients for 6 to 18 months (average monitor length 10.5 (4.2) months). All monitored patients had well-healed scars with no pain and no paraesthesia. The detailed outcomes based on the Lysholm score were presented in Table 2 & figure 2. "Good" and "very good" results were achieved in 87.14% patients, "average" in 9.09% patients and "poor" in 3.77% patients. Meanwhile, before the surgery, only 39.19% of patients had "average" score, and 61.01% of patients had "poor" functional knee movement. The difference between the preoperative and postoperative knee function was significant ($p < 0.01$).

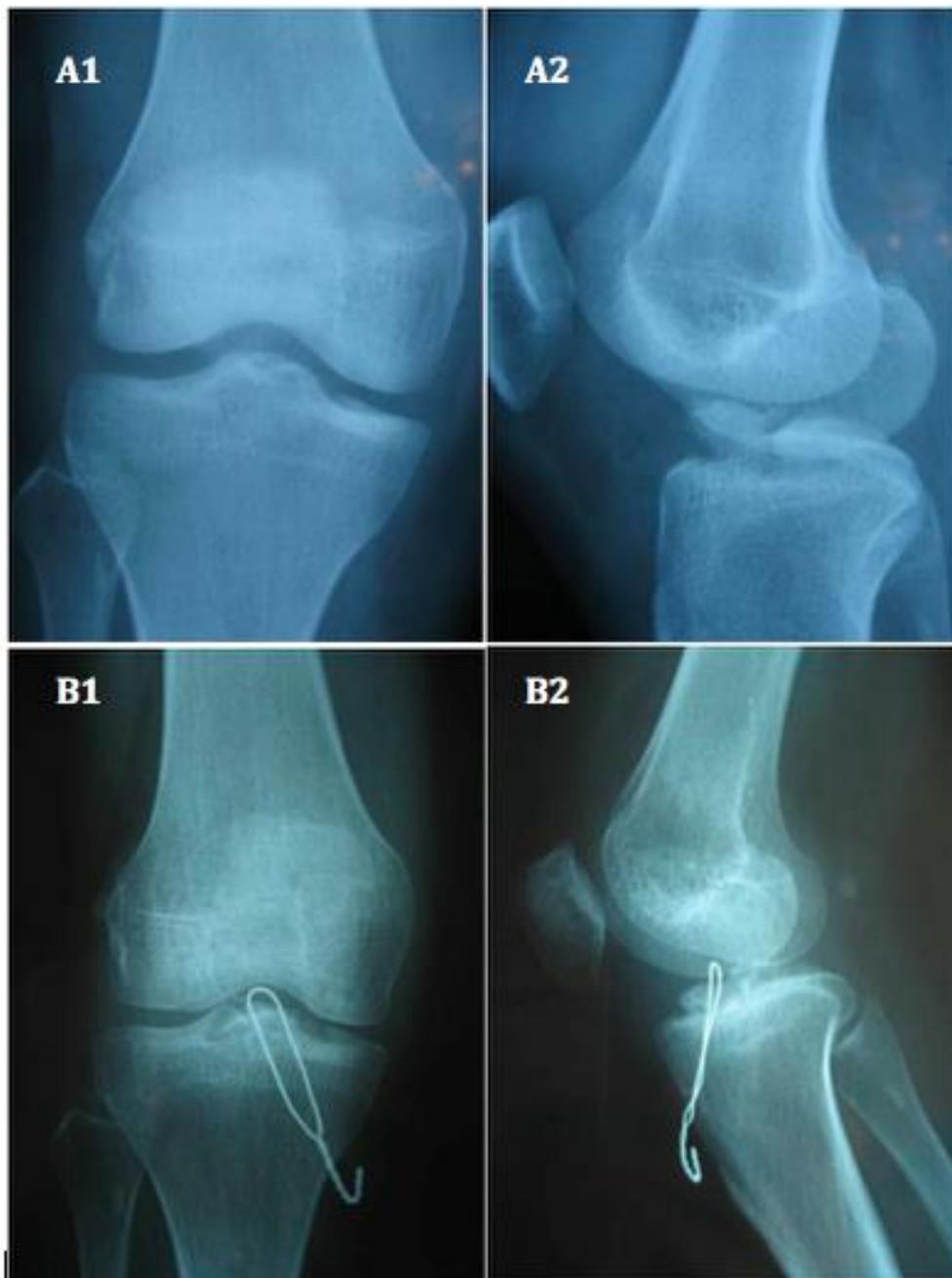


Figure 2 A female patient with anterior cruciate ligament tear before (A1-A2) and 4 months after surgery (B1-B2)

Table 2 Postoperative monitored outcome (n = 451)

	Monitored patients / Total patients	Outcomes		
		Good	Average	Poor
Anterior cruciate ligament tear	278/302	260	12	6
Meniscus rupture	64/78	58	6	0
Anterior and posterior cruciate ligament tear	43/43	30	9	4
Posterior cruciate ligament tear	20/20	15	4	1
Osteoarthritis	21/26	9	7	5
Mucous joint inflammation	7/7	3	3	1
Foreign bodies and joint stiffness	5/6	5	0	0
Anterior cruciate ligament avulsion fracture	5/5	5	0	0
Posterior cruciate ligament avulsion fracture	5/5	5	0	0
Patella medial rupture	3/3	3	0	0
Total	451/495	393	41	17
Percentage		87.14	9.09	3.77

4. DISCUSSION

Tear of the anterior cruciate ligament was the most frequent injury observed in this study, accounted for 61.01% of the cases. Meniscus rupture also had a high presence, made up of 15.76% of the cases, and 57.95% of the accompanying injury in the circumstances of anterior cruciate ligament injury. These are indeed prevalent knee injuries, as observed in many literature works, such as Truong *et al.* (2008), Nguyen *et al.* (2008). In the United States, annually 10.0000 – 20.0000 cases of anterior cruciate ligament sprains and tears were reported, with the incidence of 1 in 3500 people (Evans and Nielson, 2019). The average annual meniscus rupture rate was 60 – 70 in 100.000 people (Mafulli *et al.*, 2010). Injuries of anterior cruciate ligament occurred more in males (217 cases, 71.85%) than females (85 cases, 28.15%), and mostly took place in labor ages (74.8% cases in the ages of 21-40), and the major causes were traffic accidents and sport injuries (38.07% and 35.10%, respectively). These results were suitable with the studies of Vu (2004), Nguyen and Nguyen (2006). Anterior cruciate ligament rupture is actually considered as a frequent injury in soccer – accounted for thousands of injuries each year – and also a potential career-ending one (Padua, 2015). In this study, anterior cruciate ligament tear mostly came with accompanying injuries which were detected preoperatively by MRI or peri-operatively by arthroscopy; the most common one was meniscus ruptures (57.95%). Shelbourne *et al.* (2007) reported 69% rate of accompanying meniscus rupture, and Hagino *et al.* (2015) recorded an even higher percentage of 79.2%, with the medial rupture associated more with chronic ligament tear and lateral injury with acute ligament tear. Truong *et al.* (2008) observed a high rate of accompanying lateral meniscus rupture (63.5%), rate of rupture in the medial meniscus, and both menisci were 36.7% and 0.9%, respectively. Nguyen (2009) commented that high accompanying meniscus rupture affected surgical outcomes, although such injuries could not be identified as primary or secondary. Vu (2004) observed high accompanying meniscus rupture (50.8%), and such injuries affected knee stability and surgical results.

Lachman test is a convenient, specific, and reliable method for diagnosis. During the test, the knee slightly bends; hence the collateral ligaments are not strongly stretched, and the medial meniscus does not prevent the forward movement of the tibial condyles; the anterior cruciate ligament is the only one to stop it. Anterior drawer test is a classical indicator for tear of the anterior cruciate ligament but it has low sensitivity [20], as the knee perpendicularly flexes it stretches the ligament's anteromedial bundle and relaxes the posterolateral ones; hence the rupture of anteromedial ones can lead to signs of a positive test. Tria (2006) commented that the Lachmann test is more sensitive to the posterolateral bundle while the anterior drawer test is more sensitive to the anteromedial one and to accompanying posterior cruciate ligament. Pivot shift test is a complicated one and specific for tear of anterior cruciate ligament, related to the subluxation of the tibia compared with the femur during anterior rolling, and is meaningful in a late case or complete tear. It is ineffective in patients who are alerted because of pain and discomfort, but anesthesia can significantly increase its sensitivity (Aoyama, 2017). Anesthesia was also reported to improve the accuracy of Lachmann and anterior drawer tests, especially in women (Makhmalbaf, 2013). MRI could be considered as an effective non-invasiveness investigation of knee conditions and can detect ligament tears, posterolateral corner structures, menisci, and cartilage injuries (Hash, 2013).

In this study, anterior cruciate ligament surgery achieved "good" outcomes in 260/278 cases (93.53%) which was similar to other works such as Vu *et al.* (2008), 197 cases, 81.2%; Nguyen and Nguyen (2006), 116 cases, 91.5%; Truong *et al.* (2008), 115 cases, 89.6%; Dang (2008), 52 cases, 92.0%. The analysis of Nwachukwu *et al.* (2019) reported that arthroscopic ligament reconstruction is superior to traditional arthrotomy and recommended arthroscopy as the better choice for most cases. Amongst 78 treated meniscus rupture cases there was no difference in gender and position on the left or right knee. Injuries on lateral meniscus were most common (46.15%), followed by on medial meniscus (35.90%) and both menisci (17.95%). The reason was because of the O-shape, greater thickness, and larger size of the lateral meniscus, a discoid meniscus was even more prone to damages. The traumatic mechanism was also a reason as an impact from a posterolateral direction would rupture the lateral meniscus; tear apart the anterior cruciate and medial collateral ligaments. In the cases of torn cruciate ligaments, meniscus damages usually occurred on the white zone with no vascularity; hence most of the treatments were meniscectomy (65.38%). The meniscal repair was performed for ruptures on the red-white zone or red zone with abundance vascularity, guaranteeing self-regeneration (34.62%). Treatment outcome in this study (90.63% "good") was similar to other works such as Nguyen *et al.* (2007), 91% "good". Feutch *et al.* (2015) reported an increase of Lysholm score from 52.4 preoperatively to 85.9 operatively for treatment of posterior medial meniscus root tears. Sofu *et al.* (2016) reported an increased Lysholm score (43 to 72.7) in the treatment of acute trauma-related medial meniscal tear in patients aged over 60.

Anterior and posterior cruciate ligament tear occurred mainly on males (62.79%) and in labor age (74% cases in ages of 31 – 40), mostly caused by traffic (53.49%) and work accidents (34.88%). This injury usually had apparent clinical symptoms, all the cases were positive with Lachmann test, and anterior drawer test had signs of knee loosening, instability, and subluxation. Admitted patients often had severe knee trauma, multiple ligament injuries, knee subluxation, and risks of popliteal vascular and nervous damage. Knee reduction and vascular and nervous treatment (if needed) were performed, and then the knee was fixed for 3 – 4 weeks.

Clinical examination and MRI were then carried out before arthroscopy for both cruciate ligaments. The ruptured cruciate ligaments enlarge the posterior knee cavity and opening of two posterior portals for exposing the tibial attachment site of the posterior cruciate ligament. Consequently, the drilling of the tibial canal for the posterior cruciate ligament could be highly observable and safe to perform, which avoided the risk of damaging the popliteal vessels. Tears of both cruciate ligaments mostly had accompanying injuries (72.42%); thus, these accompanying damages also require care, and the postoperative outcome was less satisfactory (only 69.77% "good") than other cases such as meniscus rupture and anterior cruciate ligament tear with no accompanying issue. Rehabilitation time was also longer.

Unstable posterior cruciate ligament tear with no accompanying damage was less frequent than other knee damages such as in anterior cruciate ligament and meniscus. Accompanying injuries of posterior cruciate ligament tear (60.00%) included posterolateral injury, tear of a medial collateral ligament or meniscus rupture. A careful examination with MRI was needed to identify all possible issues. The orthopedic treatment of posterior cruciate ligament was also more complicated than the anterior one, and rehabilitation time was longer, too. "Good" outcome was 75.00%.

For the cases of osteoarthritis, short term outcomes of knee arthroscopy included pain remedy and improvement of knee functions but long term outcome was unsatisfactory (only 42.86% "good") due to pain recurrence and risks of disease progression to the point which required arthroplasty, hence further monitor was needed. Such poor results were expected as the effect of arthroscopy for degenerative injuries such as osteoarthritis, or degenerative meniscal tear is controversial. Katz *et al.* (2014) observed that whether arthroscopy is more effective than physical therapy is uncertain, and Siemieniuk *et al.* (2017) recommended against arthroscopy for its limited results and its accompanying burdens. Knee osteoarthritis usually progresses to the point where knee arthroplasty remains the only practical solution. Law *et al.* (2019) proposed that arthroscopy may still have its niche in, for example, patients at early stages who have failed conservative management.

5. CONCLUSION

This study investigated 495 cases of knee arthroscopy in 7A Military Hospital, Hochiminh City, Vietnam from Jun 2016 to Dec 2019, and the conclusions could be made as follow. Knee arthroscopy was a possible treatment for various knee injuries, both traumatic and pathologic, including meniscus ruptures, tear of the cruciate ligaments, osteoarthritis, mucous joint inflammation, foreign bodies, joint stiffness, cruciate ligaments avulsion fractures, and medial patellar rupture. The functional movement was significantly improved after treatment. Treatment outcomes were positive (87.14 "good" results). Knee arthroscopy has the advantages of minimal invasiveness, aesthetics, and enables throughout investigation and treatment of the knee and quick rehabilitation. Although this method is still controversial for treating degenerative injuries, we strongly encourage further efforts to apply and improve this method in treating knee damages.

Declaration

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

Contribution

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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