



Are Arthroscopic PCL Avulsion Fixation and its Long Learning Curve Morally Justified When Other Surgical Approaches are Valid? An Ethical Issue in Surgical Research

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Abstract

There are controversial disputes regarding the ethical concerns for arthroscopic posterior cruciate ligament (PCL) avulsion fixation accompanied by various complications and difficulties. Firstly, this procedure maintains long learning curve, and it is still in a cast of dilemma if this procedure is justified, when a surgeon should undergo a considerable time and efforts in order to acquire enough experience regarding this novel procedure. Secondly, when stable fixation is not achieved, one may need to shift to open surgery; the issue arises when surgeon terminates the surgery just with somewhat fixation because he does not want to demonstrate any sign of weakness regarding his surgical skills. And finally, there are specific considerations that should be taken into account in the informed consent for an innovative surgery. Here the study discusses these terms in the faiths of fashioning a catalyst for further discussions.

Keywords: Arthroscopy, Avulsion Fracture, Open Surgery, Posterior Cruciate Ligament, Surgical Research Ethics

1. Introduction

Tibial avulsion fracture of the posterior cruciate ligament (PCL) is prevalent (1). There are a lot of controversies regarding optimum management of PCL avulsion injuries. According to the recent literatures, a displaced or unstable bony avulsion of PCL should be anatomically reduced and rigidly fixed in order to obtain excellent functional results.

Among the several operative techniques described, open reduction with internal screw fixation through a posterior approach is reported as a fitting approach to achieve stability (2). With respect to deep location of the PCL, minimally invasive surgeries (MIS) are developed. Arthroscopic PCL avulsion fixation is considered as a novel and rather new approach to treat PCL with low complication rates and good clinical outcomes (1).

However, as stated by Beecher, it may appear plausible to question the moral or ethical dilemma with respect to unplanned novel surgical approaches and methods that merely may be comparable with placebo surgeries, when these approaches are financially obligating and time consuming, and threatening the health or life

(3). Though, the favorable clinical outcomes of standard open surgeries, which are demanding less technical skills, make ethical concerns regarding the long learning curve of the newly popularized arthroscopic techniques, the risk of not changing from arthroscopic to open surgery, and the specific considerations of an innovative surgery in the informed consent. The need for an increasing consciousness of ethical issues in both surgical research and clinical practice made the authors discuss the use of this newly developed arthroscopic surgery in these terms.

1.1. Learning curve of Arthroscopic PCL Avulsion Fixation Surgery

Due to novelty of this approach, long learning curve is considered as one of its drawbacks with respect to this method. Sasaki et al., concluded that the technique of arthroscopic PCL tibial avulsion fixation is as promising as open screw fixation; however, it needs more surgical experience and maintains long learning curve (4). In another study conducted by Gwinner et al., they concluded that all-arthroscopic treatment of PCL avulsion fracture provides satisfactory clinical results and hinders a second surgery

for hardware removal (5). However, with respect to mushrooming trend of arthroscopic surgeries, some ethical issues raise. For instance, when a novel approach is introduced, there is no cast of doubt that demanding and thorough testing should be addressed in order to protect patients from possible harms induced by the new methods. Bhattacharya and Catherine stated that patients should be well-informed and alert before undergoing minimally invasive procedures, specifically regarding possible risks. However, most surgeons do not offer the patients written form of information with respect to steps of the procedure and conversion rate. Furthermore, they discussed that MISs maintain a long learning curve resulting in longer time for the procedure and an increased risk of complications and chances of higher costs (6).

Nevertheless, in another study it was concluded that dedicated consultant time would simplify the teaching process of MIS; however, many consultants in this operation are tending to restrain patients from this practice (7). This is the point highly focused by the orthopedic surgeons reporting new arthroscopic procedures; they all state that the procedure is directly performed by an expert in the field. However, the question is how much it costs to get the experience and how much it costs to transfer the knowledge. In the aforementioned study, long learning curve was also observed among consultant and the ego-battle that was going on between fellow consultants with respect to conversion rate, time required for accomplishment of the procedure and hospital discharge, which indirectly would have threaten patients life (7).

These types of reports are really missing in newly introduced arthroscopic procedures, specifically in arthroscopic PCL avulsion fracture fixation. This needs an honest report of the failure rate, complications, and costs before becoming experienced in the procedure. However, when it appears plausible that notifying MISs such as laparoscopic surgeries outstanding open surgery these days, the long learning curve of arthroscopic PCL avulsion fixation surgery is justifiable if during educating and boosting experience of the surgeons it is tried to harness the ego-battle among clinicians and authorities and well informing the patients regarding the complications of the procedure.

1.2. Conversion from Arthroscopic PCL Avulsion Fixation Surgery to Open

Another concern is that in some cases, when surgeon may not reach stable fixation during the procedure due to various reasons such as experience, complications, etc., he may need to shift to open surgery; the issue arises when the surgeon hesitates this transition and in this sense, the

procedure may be considered as a sham surgery. Similarly, Francoeur discussed that conversion to laparotomy in laparoscopic surgery is the euphemism of failure mainly when surgeons want to compete with colleagues or increase the case numbers for their publications. In this sense, surgeons sometimes neglect their own surgical error instead of considering conversion as an inevitable clinical judgment (8). The same applies to arthroscopic PCL avulsion fixation surgery; the surgeon should have enough courage and confidence to tell the patient that if the procedure fails, he would shift to open surgery procedure. The confidence of the surgeon is vital in order to assure the patient regarding the procedure.

1.3. Ethics of Innovative Surgery

Although principles of ethics roots in the era of Hippocrates, modern ethical constellation shaped after Nazi physicians were found guilty of conducting various unethical experiments on humans in the name of science. Jurists at trial of Nazi physicians expressed Nuremberg Code; the essence of the 10-point Nuremberg Code embrace “voluntary informed consent, lack of coercion, correctly formulated experiments, and beneficence toward participants” (9). The Nuremberg Code was replaced by the world Medical association’s declaration of Helsinki (DoH) (10).

The DoH identifies the fact that medical procedures contain risks and shortcomings (paragraph 16); yet, it says that “medical research involving human subjects may only be conducted if the importance of the objective offsets the potential risks and problems to the research subjects” and the “Novel knowledge can never take superiority over the privileges and concern of individual research subjects” (10); this means that the general benefits are not an adequate explanation for a trial. If the threats overshadow the profits, the study should be terminated.

The open surgery for PCL avulsion fixation is compared with simple casting as the placebo intervention and is thus introduced as the gold standard. Nevertheless, arthroscopic PCL avulsion fixation is an innovative surgical approach towards the lesion. According to the literature there are some codes that should be mentioned when conducting new surgical procedures. According to these codes, arthroscopic PCL avulsion fixation can act superior to placebo interventions and hence, is ethically justified.

- Comprehensive informed consent should be acquired and the procedure should be explained completely with all possible outcomes and complications; as discussed earlier, the surgeons should not show low tendency in clarifying the procedure to the patients.

- Novel surgical techniques should not represent a minor modification of the existing approach; in this sense

arthroscopic PCL avulsion fixation surgery is not considered as a minor modification of the existing procedure, and hence, the procedure can be ethically justified.

- When current approaches are not fully responsive to patient needs, the standard treatment should be started and the informed-consent process should contain sufficient precautions; as already discussed, in arthroscopic PCL avulsion fixation the surgeon should tell the patient that if the procedure fails, he would shift to open surgery procedure.

2. Conclusion

Sometimes, surgeon's enthusiasm regarding using a specific kind of treatment would cast a shadow of uncertainty, regarding ethical principles of the procedure. Nonetheless, surgeons should maintain balance between their enthusiasm in using this novel procedure and considering specific circumstance in patients. Arthroscopic PCL avulsion fixation surgery is still a novel approach and ethically there is some resistance toward it. However, a final consensus about the ethical principles of arthroscopic PCL avulsion fixation is not yet achieved and further discussion on the issue is necessary, which is of critical importance to surgical researchers.

As mentioned, this type of surgery is efficient; however, its long learning curve is considered to raise some ethical concerns, when open surgical approaches are valid. Furthermore, surgeons should not hesitate when there are needs to shift to open surgery approach; in this regard surgeon should assure the patient that if arthroscopic PCL avulsion fixation fails due to any reasons, he would shift to open surgery. Besides, comprehensive informed consent should be obtained. However, the great potential outcomes of this novel procedure can morally justify its implication by the ones expert enough in arthroscopic procedures while notifying the points drawn out in the current paper.

The current paper presented a discussion in the field of orthopedics and arthroscopic procedures; hereby future discussions were proposed and that panels discuss the

need for appropriate informed consent, enough courage to switch to open surgery when one fails to finalize the arthroscopic procedure and appropriate legislations to inhibit general orthopedists to get involved in such long learning curve procedures. These discussions should focus on both aspects of surgical research and clinical practice use of newly developed arthroscopic procedures. The current paper presented some of the common ethical debates met in the field of arthroscopy in the faiths of fashioning a catalyst for further discussions.

References

1. Chen SY, Cheng CY, Chang SS, Tsai MC, Chiu CH, Chen AC, et al. Arthroscopic suture fixation for avulsion fractures in the tibial attachment of the posterior cruciate ligament. *Arthroscopy*. 2012;**28**(10):1454-63. doi: [10.1016/j.arthro.2012.04.141](https://doi.org/10.1016/j.arthro.2012.04.141). [PubMed: [22929009](https://pubmed.ncbi.nlm.nih.gov/22929009/)].
2. Bali K, Prabhakar S, Saini U, Dhillon MS. Open reduction and internal fixation of isolated PCL fossa avulsion fractures. *Knee Surg Sports Traumatol Arthrosc*. 2012;**20**(2):315-21. doi: [10.1007/s00167-011-1618-6](https://doi.org/10.1007/s00167-011-1618-6). [PubMed: [21761230](https://pubmed.ncbi.nlm.nih.gov/21761230/)].
3. Beecher HK. Surgery as placebo. A quantitative study of bias. *JAMA*. 1961;**176**:1102-7. [PubMed: [13688614](https://pubmed.ncbi.nlm.nih.gov/13688614/)].
4. Sasaki SU, da Mota e Albuquerque RF, Amatuzzi MM, Pereira CA. Open screw fixation versus arthroscopic suture fixation of tibial posterior cruciate ligament avulsion injuries: a mechanical comparison. *Arthroscopy*. 2007;**23**(11):1226-30. doi: [10.1016/j.arthro.2007.06.012](https://doi.org/10.1016/j.arthro.2007.06.012). [PubMed: [17986411](https://pubmed.ncbi.nlm.nih.gov/17986411/)].
5. Gwinner C, Hoburg A, Wilde S, Schatka I, Krapohl BD, Jung TM. All-arthroscopic treatment of tibial avulsion fractures of the posterior cruciate ligament. *GMS Interdiscip Plast Reconstr Surg DGPW*. 2016;**5**:Doc02. doi: [10.3205/jprs000081](https://doi.org/10.3205/jprs000081). [PubMed: [26816668](https://pubmed.ncbi.nlm.nih.gov/26816668/)].
6. Bhattacharya K, Cathrine AN. Ethical considerations in laparoscopic surgery. *Indian J Med Ethics*. 2004;**1**(1):22-3.
7. Noble H, Gallagher P, Campbell WB. Who is doing laparoscopic appendicectomies and who taught them? *Ann R Coll Surg Engl*. 2003;**85**(5):331-3. doi: [10.1308/003588403769162459](https://doi.org/10.1308/003588403769162459). [PubMed: [14594538](https://pubmed.ncbi.nlm.nih.gov/14594538/)].
8. Francoeur JR, Wiseman K, Buczkowski AK, Chung SW, Scudamore CH. Surgeons' anonymous response after bile duct injury during cholecystectomy. *Am J Surg*. 2003;**185**(5):468-75.
9. Annas GJ, Grodin MA. The Nazi doctors and the Nuremberg Code: relevance for modern medical research. *Med War*. 1990;**6**(2):120-3. doi: [10.1080/07488009008408916](https://doi.org/10.1080/07488009008408916). [PubMed: [2215362](https://pubmed.ncbi.nlm.nih.gov/2215362/)].
10. World Medical Association General A. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. *J Int Bioethique*. 2004;**15**(1):124-9. [PubMed: [15835069](https://pubmed.ncbi.nlm.nih.gov/15835069/)].