

## Retraction Notice

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Editor guiding this retraction: Dr. Samer El Hage (EB of OJO)

# Pros and Cons of General Anaesthesia on Total Knee Angioplasty (TKA) and Total Hip Angioplasty (THA)

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## Abstract

Both total knee angioplasty (TKA) and total hip angioplasty (THA) may be carried out under general anaesthesia. However, many surgeons prefer to perform the surgery under regional anaesthesia due to the profound pre-emptive analgesic effects which are provided by the regional anaesthetic techniques. Both centroneuraxis (spinal and epidural approaches) and peripheral nerve blocks are used for TKA and THA. Even though the former is used less frequently mainly in both TKA and THA due to the increased administration of low molecular heparins with the resultant epidural hematoma formation; the latter is enjoyed more popularly. In this paper, we will discuss the use of peripheral nerve blocks for both TKA and THA. In addition, the surgery also includes the use of femoral/sciatic nerve blocks as well as intra-articular injection of the local anaesthetics or even opioids at the knee and hip joints. They are mostly devoid of any extensive sympathectomy and will support helps sufficient surgical analgesia along with a motor block.

## Keywords

Total Knee Angioplasty, Total Hip Angioplasty

## 1. Introduction

General anaesthesia basically refers to the patients who are going “completely under” and essentially need a breathing tube placement along with a ventilator machine breath while they are asleep during the surgical operation. The term “general” is applied because it affects the whole body and is accompanied with complete loss of consciousness as well as motionlessness [1]. The general anaesthetic itself might also come in several different forms; some include gases mixed up with oxygen and delivered with the help of breathing tube or a mask (for

example, isoflurane and other volatiles). Some other general anaesthetics are mainly administered intravenously (such as propofol). In this paper, we have studied in detail about the pros and cons of both general anaesthesia and regional anaesthesia on total knee angioplasty and total hip angioplasty.

When choosing which anaesthesia to be given, regional anaesthesia was mostly preferred since it was linked to lesser cases of blood losses, lesser nausea and less drowsiness and on the other hand, could benefit with improved pain control specifically after the surgery and also reduction in risks of developing some serious medical complications like heart problems, heart attack or even stroke that—although quite rare—were found to occur in case of general anaesthesia. When talking about the side effects of using regional anaesthesia, these on some occasions included headaches, allergic reactions, trouble urinating, and nervous injuries [2].

Due to such complications, general anaesthesia is more often used by surgeons to carry out a surgery like any joint replacement. In addition, general anaesthesia might also be selected on the basis of patient, his surgeon, or on the preference of an anaesthesiologist or rarely if the person is unable to receive either regional or the local anaesthesia. However, unlike both regional as well as local anaesthesia, general anaesthesia was found to affect the entire body. It acted directly on the brain along with the nervous system and also rendered the patient temporarily unconscious [2].

General anaesthesia also affected both the heart along with the breathing rates, and a small risk was also associated with a number of serious medical complications such as cardiac problems. As compared to general anaesthesia, several advantages were disclosed when many surgeons used a regional anaesthesia specifically during hip as well as knee replacement surgeries [3]. Many studies in this regard showed that lesser blood loss was also another benefit of using it during other surgeries and fewer complications were linked to from blood clots [3].

## 2. Methodology

RA produces less and good pain control usually in the first couple of postoperative hours, but the major question at this point is if this advantage remains after the first 1 - 2 postoperative days or if a modern GA technique is much preferable mainly in a fast-track set-up. Hence, by comparison and proper analysis, we conducted our own research and analysis to see which method is more preferable and more pain-free.

As already studied, total knee arthroscopy (TKA) is a very common and a painful procedure. Hence, pain is unpleasant not only for the patient but also the intensity of an early postoperative pain is a very strong risk factor mostly for the development of a persistent pain. The operation is typically performed under either regional anaesthesia (RA) or general anaesthesia (GA), and in relation to this, the previous data have shown some better results after the surgery by RA. As a consequence, RA having intrathecal technique has greatly been recommended by many surgeons. However, in most cases, RA is not compared with some of the modern GA techniques having multimodal non-opioid analgesia as well as a faster track approach.

## 3. Results

Many advantages are suggested for using neuraxial anaesthesia for total joint surgeries. These mostly include modification of the entire hyper-coagulable surgical state, significant improvements in flow of regional blood, improvement in controlling of pain and reduction in the entire surgical neuroendocrine stress responses [4]. From the perspective of a surgeon, spinal anaesthesia also provides some ideal operating conditions such as profound muscle relaxation, moderate hypotension which causes reduction in blood loss and also the potential for a much faster room turnover [4].

There is a consistent comparison of both the positive and negative results of using general anaesthesia which are now being documented for utilization of general anaesthesia mainly on total knee arthroplasty (TKA) as well as on the total hip arthroplasty (THA). Our paper will specifically focus on both the advantages and disadvantages and will also propose a better alternative instead of general anaesthesia [5]. The general results obtained from comparative studies point out the following positive effects after surgery: reduction of pain in the early recovery of patients, lower costs of health care, reduced need for having joint manipulation after surgery hence, less burden of time mainly on the entire medical staff along with a hastened discharge of the operated patient from the main post anaesthesia care unit (PACU) [5].

More specifically, the hastened discharge is because of the fact that the femoral blockade now usually spares the patient from the adverse opioid-related effects, hence easing their pain and eventually allowing them to leave the hospital much earlier with agility and lesser dependence on medical facilities than the general anaesthesia.

Apart from this, there are also some negative effects that result from using general anaesthesia in both cases of TKA and THA. For instance, general anaesthesia is much more expensive when compared with the local anaesthesia and in addition to this; the entire nervous system of the patient is affected by its application [5].

Furthermore, a patient is invariably sedated by the general anaesthesia, which can be potentially risky in specific cases [5]. Thus, it is quite compelling to analyse the potential differences, however, positive and negative, experienced in the patients recovering from TKA as opposed to THA. First, TKA and the positive effects of the usage of a general anaesthesia will be discussed.

## 4. Discussion

### 4.1. Total Knee Arthroplasty and Pros and Cons of Using General Anaesthesia

While general anaesthesia is a safe option, both hip and knee replacements can be performed under regional anaesthesia [6]. Choices for regional anaesthesia include spinal anaesthesia, epidural anaesthesia, or one of a variety of peripheral nerve blocks. Many surgeons and anaesthesiologists prefer regional anaesthesia because of data showing that it can reduce complications and improve the post-surgery patient experiences such as having less pain now, less nausea, less narcotic medicine required, etc. [6].

The 2012 annual meeting of the American Academy of Orthopaedic Surgeons featured three studies that highlighted the advantages of femoral blocks over other anaesthetic approaches in tested patients. One study in particular compared two widely used protocols for perioperative pain management after total knee arthroplasty (TKA) [6].

The goal was to discern whether the general anaesthesia was the optimal pain relief for patients post TKA. The prospective, randomized controlled trial enlisted 90 patients [5]. Half of the group received epidural analgesia plus femoral nerve block (PCEA/FNB); the rest of the group received peri-articular injections plus oral opioids (PAI). Interestingly, patients in both protocols had similar lengths of stay in the hospital and similar postoperative pain scores. However, the fascinating and thus helpful result was that patients who received PCEA/FNB reported significantly less pain with ambulation on postoperative day 1, as well as less pain with regard to quality of recovery. In addition, patients in both groups reported similar pain levels on the second and third days after surgery [5].

The negative results of general anaesthesia were recorded in the following study in which a systematic review of the contemporary literature comparing general anaesthesia and/or systemic analgesia with regional anaesthesia and/or regional analgesia for TKA was performed [5]. In order to reflect contemporary surgical and anaesthetic practice, only randomized, controlled trials from 1990 onward were included. 28 studies were identified, which involved 1538 patients.

The result was quite clear, as compared to general anaesthesia (GA) or systemic analgesia, regional anaesthesia (RA) and analgesia greatly reduced the postoperative pain, morphine consumption, and opioid-related adverse effects. In addition, the overall length of stay was often reduced and rehabilitation facilitated for patients undergoing regional anaesthesia and analgesia for TKA.

However, talking about the medical conditions after surgeries using RA, then despite having a low rate of severe complications as well as published benefits in several orthopaedic procedures such as superior postoperative analgesia, reduced length of hospital stay along with an improved rehabilitation, there were many disadvantages that were associated with RA, therefore, many surgeons preferred GA. There was an inherently high block failure rate (between 0% and 67%), even though this greatly varied with the specific block along with the operator experience, and also with the different methods associated to nerve localization [7].

Furthermore, operating room delays as well as a perceived risk of having increased liability were also some major criticisms that were directed towards RA. Other limitations that forced use of GA included its training required for developing the essential technical skills for successfully operating a patient under RA and, quite recently, the expense of utilizing ultrasound equipment mainly since this method of for nerve localization increased gradually in its popularity. Lastly, majority of the patients were also very fearful of RA and were found to have many misconceptions related to this technique.

Regardless of the fact that RA is currently undergoing a renaissance, the results obtained from several meta-analyses as well as randomized and controlled trials (RCTs) compared general anaesthesia (GA) with RA particularly for many orthopaedic surgeries were found to be very conflicting. It is not very uncommon for these results obtained from large RCTs to disagree among one another and also with those that were related to

meta-analyses [7]. This latter effect was assumed to be because of the inclusion of many smaller studies, publication biases, due to sample heterogeneity that existed between different trial populations as well as meta-analysis biases. Of more importance, majority of the trials which were included in these recent meta-analyses were published originally over 30 years ago and without any doubt did not reflect any of the modern anaesthetics or related surgical practices.

Total knee arthroplasty (TKA) might be performed under either a regional or under general anaesthesia. However, selection of either of these is made on the following preoperative discussions that occur between both the anaesthetists along with the patient, having some input being received from the respective surgical team. This decision is also affected partially by the patient's medical condition, although outcomes of cardiovascular, cognitive function as well as mortality rates of both the regional as well as general anaesthesia have not been widely proved as being significantly different from each other [8].

However, several studies evaluated the overall effects of using neuraxial anaesthesia mainly on such cases. As compared to the general inhalational anaesthetics, the spinal or even the epidural anaesthesia was found to inhibit the blood pressure increases. This prime reduction might also help in leading towards a decrease mainly in the hypercoagulability which is followed in TKA [9]. In a larger case of retrospective reviews which were performed at the Hospital for Special Surgery [10], epidural anaesthesia came out with superior results mainly in reducing the cases of proximal thrombosis which were followed after the TKA surgery utilizing a tourniquet.

An important thing to note was that not all studies revealed clear advantages of using neuraxial anaesthesia mainly for TKA. A large randomized study was performed at the HSS which evaluated both the cognitive function as well as cardiovascular outcomes after TKA under both general as well as epidural anaesthesia. After evaluating around 262 elderly patients, no significant difference was found in either the cognitive functions or in cardiovascular complications specifically between the aesthetic groups. But, the thing to note was that techniques for post-operative analgesics were not being controlled in this protocol which might have played a huge role in the final outcome [9]. HSS after considering the evidence-based risks as well as benefits of using regional anaesthesia mainly for the TKA, along with their extensive clinical experience, majority of the anaesthesiologists there were of view that neuraxial anaesthetics were much superior techniques.

Both the aesthetic as well as analgesic management of the patients mainly during and also after TKA along with THA might have a significant effect on both the medical as well as surgical outcomes, and also on the patient satisfaction. In addition, the aesthetic experiences which were recorded at HSS during the last two decades also included hundreds of thousands cases and procedures of TKA and THA. It is hence very important to continually improve and adapt aesthetic along with the analgesic techniques for ensuring greatest quality in the entire medical care, minimizing the side effects and various complications, and also maintaining a much higher degree of both the efficiency along with patient satisfaction [10].

#### 4.2. Total Hip Arthroplasty and Pros and Cons of Using General Anaesthesia

Now talking about the patients undergoing total hip arthroplasty (THA), then they are mostly offered to have either regional or general anaesthesia (GA). In the study which is reported here, the safety of regional anaesthesia was examined specifically in THA. Reviewing retrospectively, then 195 cases of THA were included. The study was conducted by Brinker and his colleagues who did not find any statistical differences between both general and epidural anaesthesia associated with length of hospitalization, time of nonsurgical operating room, intraoperative femur fractures, deep infections, thromboembolic phenomena, even death [11]. From this, the researchers concluded that epidural anaesthesia was much safer for the patients who were undergoing THA. Moreover, it was also found that the spinal anaesthesia (SA) patients did much better as compared to the GA patients on various different measures [11].

Selection of accurate anaesthesia for several surgical candidates is very complex and also multifactorial and this must also account for important factors such as age, patient preference and comorbid conditions. In another study for this investigation, usage of SA resulted in significant decrease of operative time, decreased rate of both intraoperative as well as postoperative blood loss and also transfusion requirement [11]. These findings have greater implications for maximization of both the cost-effectiveness of THA along with the quality of patient safety and care. From these studies, we can conclude that SA is much superior to GA in case of THA, especially in the aged patients or patients having significant comorbidities that might preclude using endotracheal GA.

The above studies for both TKA and THA showed positive effects with RA and negative effects with GA. A

recent meta-analysis also showed that the incidence of DVT mainly in THA was greatly reduced by using RA as compared to GA but there were no similar meta-analyses for the case of TKA [12]. However, in one study, it was found that using RA resulted in a decreased incidence of DVT and due to this, the patients received no chemical thromboprophylaxis.

### 4.3. Alternative to General Anaesthesia

An alternative for general anaesthesia in case of both TKA and THA is using ultrasound-guided peripheral nerve blocks [11]. These have been reported as being safer and much effective when compared with general anaesthesia as well as central neuraxial blocks mainly in the elderly high-risk patients who undergo repairing of the femoral neck fracture [11]. According to a European study, the elderly patients are potentially at a greater risk of hypotension as well as postoperative delirium and hence ultrasound does not alter their overall mental state and may help in contributing to lower rates of morbidity along with mortality.

Dr. Litz is in favour of using ultrasound-guided peripheral nerve blocks and in this regard, he said that spinal anaesthesia as well as general anaesthesia can significantly help in impairing the overall mental state of the patient [4]. According to him, the main idea behind this case is using an anaesthetic technique that has much lower incidence of hypotension which is an important risk factor for complete mental impairment. Hence, the best technique for maintaining hemodynamic state of the patient is to use ultrasound-guided peripheral nerve blocks.

To prove himself, Dr. Litz conducted a surgery of 50 patients and after the operation, all were discharged to the ward successfully and no block-related complications were developed. After the surgery, the deaths of two patients were due to pre-existing pneumonia, Dr. Litz said [4]. According to Jeff Gadsden, the combined block usually takes approximately 10 minutes to perform but in the experienced hands only, however, this time commitment must not be too onerous for anaesthesiologist who are still average in their fields. Lastly, it can be said that these approaches for using blocks are not technically very challenging, hence the regional anaesthesiologists should duplicate these results and should get rid of both RA and GA [4].

### 4.4. Some Complications

Some other major factors that should be kept in mind while making decisions for using either aesthetic or analgesic technique for both TKA and THA include complications as well as adverse events. Every regional aesthetic technique that is described above are also associated with the following risks: bleeding, block failure, nerve damage, vascular injury, and also infection. Both neuraxial techniques as well as deep peripheral nerve catheters are also linked with some devastating bleeding complications. When opioids are utilized in neuraxial anaesthesia, severe respiratory depression may also occur. Other opioid-related side effects include sedation, urinary retention, pruritus, and postoperative nausea or vomiting.

Although cases of bacterial colonization are also common with use of certain catheters, the risk for having infection is considerably low. In a recent study, the incidence of having bacterial colonization mainly for the femoral catheters was reported of being higher up to 57% when catheters were removed after 48 hours. In addition, abscesses, cellulitis, as well as transient bacteraemia were also reported with CPNBCs. The patient having diabetes mellitus also increased the risk for having an infection. Thus, appropriate steps for reducing the risk of infection usually includes limiting the overall duration of the catheter use as well as following some strict aseptic guidelines [9].

## References

- [1] U.S. Pharmacopeia Staff (2002) Complete Drug Reference. Consumer Reports, Yonkers. <http://www.surgeryencyclopedia.com/A-Ce/Anesthesia-General.html#ixzz3VLqfwZZT>
- [2] AAOS (2014) Anesthesia for Hip and Knee Surgery. <http://orthoinfo.aaos.org/topic.cfm?topic=a00372>
- [3] Johns Hopkins Health System (2013) Anesthesia for Hip & Knee Replacement Surgery. [http://www.hopkinsmedicine.org/johns\\_hopkins\\_bayview/medical\\_services/specialty\\_care/orthopaedic\\_surgery/joint\\_effort/anesthesia\\_for\\_hip\\_knee\\_replacement\\_surgery.html](http://www.hopkinsmedicine.org/johns_hopkins_bayview/medical_services/specialty_care/orthopaedic_surgery/joint_effort/anesthesia_for_hip_knee_replacement_surgery.html)
- [4] Provenzano, D.A. and Viscusi, E.R. (2012) Regional Anaesthesia for Total Joint Arthroplasty. *Pain Medicine News*, **2**, 16-21.
- [5] Hawkins-Simons, D. (2012) Femoral Blocks a Boon For Hip, Knee Surgery. *Clinical Anaesthesiology*, **38**, 1-3.

- [6] Towson Orthopaedic Associates (2013) Total Hip Replacement. [http://www.towsonortho.com/pageflip\\_dalury/hip-1.htm](http://www.towsonortho.com/pageflip_dalury/hip-1.htm)
- [7] Macfarlane, A.J., Prasad, A.G., Chan, V.W.S. and Brull, R. (2009) Does Regional Anesthesia Improve Outcome after Total Knee Arthroplasty? *Clinical Orthopaedics and Related Research*, **467**, 2379-2402. <http://dx.doi.org/10.1007/s11999-008-0666-9>
- [8] Palmer, S.H. (2014) Total Knee Arthroplasty. <http://emedicine.medscape.com/article/1250275-overview>
- [9] Ritchie, P.A. (2010) Anesthesia and Analgesia for Total Knee Replacement and Total Hip Replacement at Hospital for Special Surgery. [http://www.hss.edu/professional-conditions\\_anesthesia-analgesia-for-total-knee-hip-replacement.asp#.U6v6J7FJ2gY](http://www.hss.edu/professional-conditions_anesthesia-analgesia-for-total-knee-hip-replacement.asp#.U6v6J7FJ2gY)
- [10] Hospital for Special Surgery (2013) Regional Anaesthesia Technique Significantly Improves Outcomes of Hip and Knee Replacement. <http://www.sciencedaily.com/releases/2013/05/130501085803.htm>
- [11] Maurer, S.G., Chen, A.L., Hiebert, R., Pereira, G.C. and Di Cesare, P.E. (2007) Comparison of Outcomes of Using Spinal versus General Anaesthesia in Total Hip Arthroplasty. *The American Journal of Orthopaedics (Belle Mead, N.J.)*, **36**, E101-E106.
- [12] Mauermann, W.J., Shilling, A.M. and Zuo, Z.Y. (2006) A Comparison of Neuraxial Block versus General Anaesthesia for Elective Total Hip Replacement: A Meta-Analysis. *Anaesthesia & Analgesia*, **103**, 1018-1025. <http://dx.doi.org/10.1213/01.ane.0000237267.75543.59>

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