The best modern practices to reduce surgical complications after total hip and knee replacement

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Abstract

Although there is the use of pharmacological prophylaxis to prevent venous thromboembolic diseases after total hip or knee replacement, venous thromboembolism is considered one of the main and serious complications. Moreover, the incidence of deep venous thrombosis among the patients who have total hip or total knee replacements is still high. The use of regional anaesthesia in arthroplasty has been increasing recently. In addition to its effects in elimination pain, regional anaesthesia may help to reduce the incidence of postoperative thromboembolism. Given this, this paper aims to highlight the role of regional anaesthesia to improve outcomes of hip and knee arthroplasty.

Key words: total hip and knee replacement; deep venous thrombosis; arthroplasty; regional anaesthesia

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INTRODUCTION

Most total hip or knee replacements are performed for advanced osteoarthritis. The other common causes are rheumatoid arthritis and avascular necrosis or fractures such as proximal femoral fracture (Singh, 2011; Lenza et al., 2013).

A systematic review done by Singh (2011) revealed a growing prevalence of total hip replacement and total knee replacement over the last decade worldwide. In USA, the prevalence of total knee replacement was increased from 5.5 to 8.7 per 1,000 populations in 2000–2006 and that of total hip replacement from 9.5/100,000 to 15.2/100,000 in 1990–2002 (Kurtz et al., 2005). The risk of death after total hip or knee replacement is increasing, and by identifying the modifiable factors, it may help to minimise the mortality rate (Berstock et al., 2014). Therefore, postoperative complications and the best practices to reduce complications are the most important issues of concern.

POST-TOTAL HIP AND KNEE REPLACEMENT COMPLICATIONS

The main complications of total hip and knee replacement

are deep venous thrombosis and pulmonary embolism (Colwell et al., 2010). Also they may lead to dislocation, fracture, infections, and neural deficit (Healy et al., 2013).

Patients undergoing total hip or knee replacement remain at high risk for deep venous thrombosis and pulmonary embolism (Fisher, 2011). A study from Chotanaphuti et al. (2007) was reported that 61% of patients without thromboprophylaxis were positive for deep venous thrombosis following the total knee replacement. A systematic review showed the incidence of deep venous thrombosis without prophylaxis was up to 42–57% after total hip replacement and 41–85% following total knee replacement (Kim et al., 2013).

White et al. (2002) stated 2–4% of patients diagnosed with deep venous thrombosis. Della et al. (1998) reported that without thromboprophylaxis, the incidence of deep venous thrombosis or pulmonary embolism after total hip and knee replacement exceeded 50%.

The most common cause of mortality after total hip replacement is pulmonary embolism, with a mortality rate of 3–6%, and the incidence of thromboembolic complications

is 4% within 90 days of total hip replacement. Furthermore, it has been reported that total hip replacement has a higher mortality rate than total knee replacement (Berstock et al., 2014).

It has been identified that extended medical thromboprophylaxis plays a role in reducing the risk of thromboembolism (White et al., 2002); however, the benefits of thromboprophylaxis can cause serious complications such as retropulmonary embolism, intracranial or intraocular bleeding. Also, epistaxis or hematuria may be the sequel (Schulman et al., 2010). Additionally, the use of thromboprophylaxis increases risks of infection, blood transfusion, and unhealed wound (Burnett et al., 2007).

About 40% of patients undergoing total hip or knee replacement do not receive pharmacological prophylaxis due to an increased risk of bleeding. Although the mechanical methods have been used, they are not effective tools to prevent thromboembolic complications. The benefits and the complications of pharmacological prophylaxis should be considered (Autar, 2011). Despite complications in its use, it advocates an extended use of pharmacological prophylaxis in total hip replacement for 28–35 days and in total knee replacement for 10–14 days, in the absence of any contraindication (Autar, 2011). Therefore, an alternative method that may help to reduce complications and improve the outcomes of total hip or knee replacement is recommended.

THE ROLE OF REGIONAL ANAESTHESIA IN TOTAL HIP AND KNEE REPLACEMENT

The advanced surgical and anaesthesia techniques have improved the outcomes of arthroplasty (Berger et al., 2009). The use of regional anaesthesia, either central neuraxial blockade or peripheral nerve blockade has been increasing over the last decade (Macfarlane et al., 2009).

Regional anaesthesia is considered a safe technique, resulting in extremely rare complications. It may be associated occasionally with minor tenderness and/or bruising at the injection site, while nerve block may be followed by numbness and tingling for a limited time (Macfarlane et al., 2009).

A study (Liu et al., 2014) noted that the postoperative recovery from peripheral nerve blockade in total knee replacement is faster than general anaesthesia ($P < 0.001$). With regional anaesthesia, pre- and post-operative pain elimination reduces the duration of hospital stay, morphine consumption, and nausea and vomiting (Berger et al., 2009; Macfarlane et al., 2009). Berger et al. (2009) stated that 150 patients who had total hip replacement were discharged at day of surgery, while 87 of these patients were able to walk without any assistant devices.

The use of peripheral nerve blockade provides muscle relaxation, vasodilation, and improves limb perfusion. It may also reduce the incidence of bleeding and improve operative outcomes (Macfarlane et al., 2009) compared with central neuraxial blockade (Mauermann et al., 2006). In addition, it can reduce the risk of thromboembolic complications: for deep venous thrombosis, odds ratio (OR) = 0.45, 95% confidence interval (CI) (0.24 to 0.84); for pulmonary embolism, OR = 0.46, 95% CI (0.29 to 0.80) (Hu et al., 2009). No risk of hematoma or bleeding is noted in combination of peripheral nerve blocks and thromboprophylaxis and/or aspirin, and it can be performed safely (Chelly and Schilling, 2008).

No difference is demonstrated in the incidence of deep venous thrombosis or pulmonary embolism between general anaesthesia and regional anaesthesia. However, intraoperative blood loss and blood transfusion are reduced among patients undergoing regional anaesthesia compared with general anaesthesia (Macfarlane et al., 2009).

There is compelling evidence to support the use of regional anaesthesia over that of general anaesthesia. Regional anaesthesia reduces the duration of surgery, postoperative vomiting, thrombotic complications and blood transfusion. In addition, the use of peripheral nerve blockade to minimise the use of opioids and their consequent side effects may be beneficial (Hu et al., 2009). As other methods, regional anaesthesia has both benefits and adverse effects; however complications arising from their use are less likely to be severe. Recent evidence proves the trend towards the increased use of regional anaesthesia for total hip and knee replacement, with or without general anaesthesia; however, its role in reducing the incidence of thromboembolic complications is still unclear (Hu et al., 2009). There is still insufficient evidence of randomized controlled trials regarding the influence of regional anaesthesia in deep venous thrombosis or pulmonary embolism (Dauphin et al., 1997; Macfarlane et al., 2009).

CONCLUSION

Thromboprophylaxis plays an important role to decrease the incidence of deep venous thrombosis and pulmonary embolism post arthroplasty. However, complications of its use are often serious and life-threatening. Based on aforementioned evidence, regional anaesthesia has many advantages and can be used safely in patients undergoing arthroplasty. Its role on the incidence of deep venous thrombosis and pulmonary embolism in arthroplasty is still unclear and further randomized controlled trials are recommended to examine the influence of regional anaesthesia in total hip and knee replacement.

Conflicts of interest

The authors declare no competing financial interests.

Author contributions

Both authors collected data, wrote the paper, and approved the final version of this paper for publication.

Plagiarism check

This paper was screened twice using CrossCheck to verify originality before publication.

Peer review

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