The Effects of General Anaesthesia Versus Regional Anaesthesia Following Total Knee Replacement

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ABSTRACT

Aim: This study evaluated the effects of patients with total knee replacements following general anesthesia or regional anesthesia. Regional anesthesia was limited to spinal or epidural approach.

Methods: The study population comprised 52 patients from 1st January 03 to December 03 with total knee replacements. 26 patients who had general anesthesia were compared against a randomly selected 26 patients who received regional anesthesia.

Results : The study revealed:

- An increase in acute retention of urine in-patients who received regional anesthesia.($p<0.05$)
- An increase in urinary tract infection in patients who received regional anesthesia ($p<0.05$)
- An increased average length of stay in patients who received regional anesthesia ($p<0.05$)
- An increased average bill size in the patients who received regional anaesthesia ($p<0.05$)
- No difference in the incidence of constipation between both groups ($p=0.54$)
- No significant difference in readmission within 30 days for both groups (7.6%).

Discussion: The study revealed an interesting contrast in patients' outcomes following general anaesthesia versus regional anaesthesia. Although general anesthesia was advocated for all patients, this may not be feasible for some patients due to concomitant conditions.

Conclusion: Patients undergoing total knee replacements under general anaesthesia generally fared better than those with regional anesthesia.

INTRODUCTION

Singapore is in an era of a rapidly graying society. With rapid advancement and acceleration in technological and pharmaceutical arena, life expectancy of Singapore population has improved from 78.4 years in 2001 to 78.9 years in 2004 (Ministry of Health, 2004). Thus, the elderly population is expected to surge by more than three times the present number of 1,055,000 people by year 2010. This spiraling figure accounts for a quarter of the Singapore population, has a significant impact on the challenges confronting the healthcare industry of Singapore.

The elderly population generally experiences various degenerative physiological processes. One of the common ailments is knee arthritis. Knee arthritis is a condition in which the cartilage of the knee is damaged or worn away, leaving the bones rubbing together, to cause friction, pain and eventually deterioration of the bone surfaces. An individual with arthritis, affecting unilateral or bilaterals lower limbs may experience debilitating impact on activities of daily living, restricted mobility as well as a confined social life.

Arthritis can be treated conservatively. Analgesics such as nonsteroidal anti-inflammatory pain medications, commonly referred to as NSAIDs are commonly prescribed to relieve pain and reduce swelling.

Intra-articular corticosteroid injection is another option when pain is not relieved by nonsteroidal anti-inflammatory medications and for patients with contraindication to NSAIDs.

Another treatment option is physiotherapy. Physiotherapists use different modalities to increase strength, regain mobility, and help return patients to their pre-injury level of activity.

Currently, total knee replacement is the only option when conservative treatments have failed. Surgery is the treatment of choice when pain becomes intolerable and interferes with all aspects of normal living, significantly altering quality of life. Total knee replacement is a major operation involving a stay in the hospital ranging from five to ten days, until it is safe to walk with aid of walking sticks or crutches. The operation lasts one to two hours. Total knee replacement requires some form of anaesthesia prior to surgery.

Anaesthesia for total knee replacement can be either general or regional anaesthesia. General anaesthesia may be induced and maintained by a number of drugs, depending on the anaesthetist's preference and condition of the patient. Regional anaesthesia usually takes the form of a spinal injection of local anaesthetic to induce surgical anaesthesia, but epidural anaesthesia may also be used.

LITERATURE REVIEW

Using the key words, "anaesthesia general", "anaesthesia, regional", "surgery and total knee replacement", a literature search was conducted using

Medline, Ovid, Cinahl, Cochrane Library collection and other internet searches. There were approximately 1000 to 2000 articles listed with the above key words respectively. Several studies compared the effects of patients who received general anaesthesia or regional anaesthesia. Post operative urinary retention is an important problem following major orthopaedic surgery increasing morbidity[1]. A study revealed that urinary retention occurs most frequently in elderly patients after a spinal anaesthesia[2]. Another study conducted revealed that general anaesthesia was associated with a small but statistically significant reduction in the length of operation[3]. A study revealed that epidural anaesthesia remains a safe practice with a low rate of severe complications[4].

However, there were no study conducted or articles published on the effects of patients with total knee replacement following general anaesthesia or regional anaesthesia both internationally or locally.

Purpose of Study

This study aimed to evaluate the effects of patients with total knee replacements following general anaesthesia or regional anaesthesia. Regional anaesthesia was limited to spinal or epidural approach.

Design

The study compared two groups of patients who were admitted electively for total knee replacement. One group received general anaesthesia and the other group received regional anaesthesia.

Both groups receive standard of routine care or a "reactive treatment" wherein the surgeons responded to the condition of the patients in providing post-operative care.

Setting

The study was conducted at an 800-bedded secondary teaching hospital in the eastern region of Singapore.

METHODOLOGY

A one-year prospective analysis was conducted for 52 patients admitted electively to the Department of Orthopedic Surgery for unilateral primary elective total knee replacement for osteoarthritis in 2003. These patients received either general or spinal anaesthesia. Out of 52 patients with total knee replacement surgeries, 26 patients received general anaesthesia and 26 patients received regional anaesthesia. Regional anaesthesia was limited to either spinal or epidural approach. The patients' data and details of the operation were collated and analyzed. A comparative study was conducted between the 2 groups of patient receiving either general anaesthesia or regional anaesthesia. Samples were paired according to demographics data.

Data Analysis

The data was analysed using SPSS Software System (Statistical Package for Social Sciences). T-test for independent groups, means, standard deviation, mode and chi-square were used to analyze the statistical significance of the differences between the two groups of patients.

RESULTS

Twenty-six patients with total knee replacement surgeries received general anaesthesia were compared to 23 patients from the group receiving regional anaesthesia . The details of the outcome measures were as follows:

Demographic data

There was no significant difference in the ages of the patients who received either general or regional anaesthesia groups (p=0.998). For patients who received general anaesthesia, the youngest and oldest patients were 44 and 79 years old. The youngest and oldest patients from the group receiving regional anaesthesia were 51 and 79 years old. The mean ages between these two groups were statistically insignificant. These are reflected in table 1.

Table 1

	General Anaesthesia	Regional Anaesthesia
Mean	63	67
Median	60.5	68.5
Standard Deviation	10.96	8.26

There were 8 men and 18 women in the group receiving general anaesthesia and 9 men and 17 women in the group receiving regional anaesthesia. There were more females in both groups . This was statistically not significant, p=0.768.

Comorbidities

The 3 common comorbidities for patient admitted for total knee replacement were hypertension, hyperlipidemia and diabetes.

Outcome measures

The outcome measures included the followings:

- Acute retention of urine
- Urinary tract infection
- Constipation
- Length of stay
- Bill size
- Readmission

Acute retention of urine

There was a statistically significant increase in acute retention in urine in patients who received regional anaesthesia as compared to the group who received general anaesthesia ($p<0.05$). 8% of the patients who received regional anaesthesia developed acute retention of urine compared to 35% of the patients who received regional anaesthesia. This is translated to a 27% increase in the acute retention of urine in patients who received regional anaesthesia.

Urinary tract infection

There was a statistical significance in patients who developed urinary tract infection for patient who received regional anaesthesia. 19% of the patients who received regional anaesthesia developed urinary tract infection and no patient with general anaesthesia developed urinary tract infection. This could be attributed to the increased incidence of acute retention of urine in the same group of patients.

Constipation

Thirty-one percent of the patients who received general anaesthesia developed constipation compared to 23% in the regional anaesthesia group. However, it was not statistically significant, p=0.224.

Length of stay (LOS)

There was a statistical significance in the mean length of stay for patient who received general anaesthesia ($p<0.05$). The mean LOS for the group receiving regional anaesthesia was 13.4 days while the group receiving general anaesthesia was 8.38 days. These are reflected in table 2.

Table 2

	General Anaesthesia	Regional Anaesthesia
Mean	8.38 days	13.4 days
Median	7 days	9 days
Standard Deviation	3.04	11.6

Hospitalization cost

Total hospital costs were computed for all patients a week post discharge. The bill size of the patients with general anaesthesia was $11,115 compared to $13,225 for patients who received regional anaesthesia. The mean hospitalization bill size was reduced by 18.5%, which was a $2110 reduction.

Patients with regional anaesthesia required more pain management using pain control analgesia which may contribute to the increased bill size

Table 3

	General Anaesthesia	Regional
Mean	$11115	$13225
Median	$10904	$11580
Standard Deviation	$1506	$4680

Readmission

The readmission rate was not significant for both groups. 7.6% (n=2) were readmitted for both groups.

DISCUSSION

The study revealed results of 56 patients who had either regional or general anaesthesia for total knee replacements. The results of the research showed a significant advantage for general anaesthesia over regional anaesthesia in terms of incidence of urinary tract infection and acute retention of urine.

The reduction in incidence of acute retention of urine and urinary tract infection had domino effect upon length of hospital stay reducing average bill size.

Limitation

Our study was limited in several ways. Firstly, our sample size was small and this could be viewed as bias. Secondly, we did not include patients who received continuous pain control analgesia.

CONCLUSION

This study concluded that there is a high incidence of acute retention of urine and urinary tract infection in patient receiving regional anaesthesia following total knee replacement. Patients with general anaesthesia generally fared better compared to regional anaesthesia.

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REFERENCES

1 Butwich A, Carter P, Dolin SJ. A pilot study of the effect of the Queen's Square external bladder stimulator on urinary retention after knee replacement surgery. 2003; 58(6): 587-591.

2. Chelly JE, David BB, Williams BA, Kentor ML. Anaesthesia and postoperative analgesia: outcomes following orthopaedic surgery. 2003; http://www.orthobluejournal.com/supp/0803/celly.asp.

3 Urwin SC, Parker MJ Griffiths S. General versus regional anaesthesia for hip fracture surgery: a meta-analysis of randomized trials. British Journal of Anaesthesia 2000; 84 (4): 450-455.

4. Schug, Stephan A. Epidural anaesthesia and analgesia for surgery: still going strong? Current Opinion in Anaesthesiology 2003. 16(5):487-492.