

Anesthesia Technique Selection Pattern in Patients Undergoing Lower Extremities Surgery at Dr. Hasan Sadikin General Hospital from January–June 2013

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Abstract

Background: Musculoskeletal problems of the lower extremities are becoming more frequent lately. This problem usually requires surgery to be dealt quickly. The role of the anesthesiologist is needed to determine which anesthesia technique that has to be performed. Selection of proper anesthesia technique can reduce the incidence of complications. Objective of this study was to determine anesthesia technique selection pattern in patients undergoing orthopedic surgery at Dr. Hasan Sadikin General Hospital from January–June 2013.

Methods: A quantitative study with retrospective descriptive method was conducted. This study was carried out from September–October 2013 at Dr. Hasan Sadikin General Hospital Bandung. Medical records were used as a research instrument. Data collection was conducted using total sampling method. There were 228 data of all cases, but only 151 patients who met the inclusion and exclusion criteria.

Results: One hundred fifty one patients were identified. Sixty five subjects (43%) were performed under general anesthesia, 83 subjects (55%) under regional anesthesia and 3 subjects (2%) under combination of general-regional anesthesia. Regional anesthesia techniques consisted of spinal anesthesia (29%), epidural anesthesia (64%), combination of spinal-epidural anesthesia (5%), and peripheral nerve block (2%).

Conclusions: Regional anesthesia is the most frequently technique used in lower extremities orthopedic surgery, with epidural anesthesia as the most common regional technique used because of all the benefits.

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Keywords: Anesthesia techniques, epidural anesthesia, lower extremities, orthopedic surgery

Introduction

Musculoskeletal problems which are the responsibility of orthopedic surgery, later are becoming more frequent. Data obtained from a study in the United Kingdom (2006) showed that the most common musculoskeletal problems occurring at any age are a problem on the back, with the second most common is on the knee. Unlike in children, the most common complaint is on foot.¹ Complaint in the lower extremities is one of the most common musculoskeletal problems. Lower extremities musculoskeletal problems in both adults and children usually require surgery. This action should be dealt quickly. The roles of anesthesiologists are needed to determine which anesthesia technique that has to be

performed either in emergency surgery, or elective surgery.

There are various anesthesia techniques that can be used in lower extremities surgery, thus general anesthesia, regional anesthesia, and combination of general-regional anesthesia techniques. Many researchers have conducted studies to compare the most effective anesthesia technique, between general anesthesia, regional anesthesia, and combination of these two techniques.^{2,3} All types of anesthesia techniques have advantages and disadvantages of each. In general, all types of anesthetic techniques have risks. However, this can be reduced if the selection of anesthetic technique is conducted with careful consideration of all factors.

The aims of this study were to know

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Table 1 Frequency of Anesthesia Technique Usage

Anesthesia Techniques	f	%
General	65	43
Regional	83	55
Combination	3	2
Total	151	100

the frequency of using various anesthesia techniques, and to determine the selection pattern of all anesthesia techniques based on variables. This study was conducted at Dr. Hasan Sadikin General Hospital Bandung because it is considered as a top referral hospital in West Java Province. Plenty of orthopedic surgeries in particular lower extremities surgery have been performed.

Methods

This study was carried out from September–October 2013 at Dr. Hasan Sadikin General Hospital Bandung. All data were taken from Dr. Hasan Sadikin General Hospital's Medical Record Department after approved by Health Research Ethics Committee.

This retrospective study was conducted by collecting secondary data from medical records of all patients who underwent orthopedic surgery of the lower extremities under anesthesia techniques from January–June 2013. Data collection was conducted using total sampling method. Emergency and elective surgery cases were included. Outpatients, patients who underwent one day surgery (ODS), patients who received local anesthesia, and patients whose data were incomplete or unclear in medical record were excluded in this study.

There were 228 data of all cases, but only 151 patients who underwent orthopedic surgery of the lower extremities under anesthesia techniques from January–June 2013 who were subjects who met the inclusion

and exclusion criteria.

Data processing was conducted after data collection had been completed. First, it was calculated how many patients undergoing orthopedic surgery on the lower extremities under general anesthesia, regional anesthesia, or combination of general-regional anesthesia at Dr. Hasan Sadikin General Hospital from January–June 2013. Then, anesthesia technique used, patient's age, sex, part of body being operated, The American Society of Anesthesiologists (ASA) score category, scope of orthopedic surgery, length of surgery, and hospital length of stay after surgery were recorded. Calculation of each type anesthesia technique used was presented by using a single table. At the same time, the calculation for the characteristics of age, sex, part of the body being operated, ASA score category, scope of orthopedic surgery, length of surgery and hospital length of stay were presented by using cross-tabulation table. Then, the results would be described through discussion.

Results

There were 151 patients who underwent orthopedic surgery of the lower extremities under anesthesia techniques from January–June 2013 who were identified.

Of a final 151 subjects identified, patients who underwent lower extremities orthopedic surgery under anesthesia techniques were divided into three groups. Anesthesia technique used at most was regional anesthesia.

Of a total 83 subjects who were performed

Table 2 Frequency of Regional Anesthesia Technique Usage

Regional Anesthesia techniques	f	%
Spinal	24	29
Epidural	53	64
Spinal epidural	4	5
Peripheral nerve block	2	2
Total	83	100

Table 3 Selection of Anesthesia Techniques based on Characteristics

	Anesthesia Techniques										Combination	
	General		Regional						Peripheral Nerve Block			
			f	%	f	%	f	%			f	%
Age (years old)												
<18	36	23.8	2	1.3	2	1.3	0	0.0	0	0.0	0	0.0
≥18	29	19.2	22	14.6	51	33.8	4	2.7	2	1.3	3	2.0
Sex												
Male	42	27.8	15	9.9	38	25.2	2	1.3	0	0.0	2	1.3
Female	23	15.2	9	6.0	15	9.9	2	1.3	2	1.3	1	0.7
Region												
Gluteal	6	4.0	2	1.3	5	3.3	1	0.7	0	0.0	1	0.7
Femoral	18	11.9	9	6.0	14	9.3	0	0.0	0	0.0	1	0.7
Knee	3	2.0	2	1.3	4	2.7	1	0.7	0	0.0	0	0.0
Leg	25	16.6	8	5.3	24	15.9	1	0.7	0	0.0	0	0.0
Ankle	3	2.0	1	0.7	3	2.0	1	0.7	0	0.0	0	0.0
Foot	10	6.6	2	1.3	3	2.0	0	0.0	2	1.3	1	0.7
ASA Score												
1	45	29.8	16	10.6	25	16.6	2	1.3	0	0.0	2	1.3
1E	5	3.3	0	0.0	2	1.3	0	0.0	0	0.0	0	0.0
2	11	7.3	6	4.0	14	9.3	1	0.7	0	0.0	1	0.7
2E	2	1.3	0	0.0	2	1.3	0	0.0	1	0.7	0	0.0
3	1	0.7	2	1.3	9	6.0	1	0.7	1	0.7	0	0.0
3E	0	0.0	0	0.0	1	0.7	0	0.0	0	0.0	0	0.0
4	1	0.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Scope of Orthopedic Surgery												
CDA	8	5.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
II	3	2.0	1	0.7	3	2.0	0	0.0	0	0.0	0	0.0
RAM	2	1.3	1	0.7	1	0.7	0	0.0	0	0.0	0	0.0
DBJ	0	0.0	1	0.66	4	2.7	0	0.0	0	0.0	0	0.0
ND	1	0.7	3	2.0	5	3.3	1	0.7	2	1.3	0	0.0
Tumor	6	4.0	1	0.7	2	1.3	0	0.0	0	0.0	0	0.0
Trauma	45	29.8	17	11.3	38	25.2	3	2.0	0	0.0	3	2.0
Length of Surgery (min)												
<60	4	2.7	5	3.3	1	0.7	1	0.7	1	0.7	0	0.0
60–120	32	21.2	14	9.3	25	16.6	2	1.3	1	0.7	0	0.0
>120	29	19.2	5	3.3	27	17.9	1	0.7	0	0.0	3	2.0
Hospital Length of Stay (week)												
<1	52	34.4	22	14.6	46	30.5	3	2.0	2	1.3	2	1.3
1–2	13	8.6	1	0.7	6	4.0	1	0.7	0	0.0	1	0.7
>2	0	0.0	1	0.7	1	0.7	0	0.0	0	0.0	0	0.0

Note: ASA=The American Society of Anesthesiologists; CDA=congenital and developmental abnormalities; II=infection and inflammation; RAM=rheumatic disease, arthropathy, and metabolic arthritis; DBJ=degenerative disorder of bones and joints; ND=neuromuscular disorder

under regional anesthesia, epidural anesthesia was the most common regional anesthesia technique used (64%). More than half of a total subjects were performed under epidural anesthesia (Table 2).

While the most common anesthesia technique used in adult group (≥ 18 years old) was regional anesthesia, particularly epidural anesthesia (33.8%), in children group (< 18 years old) it was general anesthesia (23.8%).

Identified from patients' sex, the most common anesthesia technique used in male subjects was regional anesthesia, particularly epidural anesthesia (25.2%). The same result was obtained in female group. Epidural anesthesia (9.9%) was also the most common regional anesthesia technique used in female group.

Lower extremities were divided into six regions. Surgery on the leg region (38.4%) was the most common with the most widely anesthesia technique used was regional anesthesia, particularly epidural anesthesia (15.9%).

To assess the physical status of patients before surgery, ASA physical status classification system was used. The most common ASA score was ASA 1, with the most widely anesthesia technique used was general anesthesia (29.8%).

Identified from scope of orthopedic surgery found in this study, trauma cases (70.2%) were the most common case, with the most widely anesthesia technique used was regional anesthesia, particularly epidural anesthesia (25.2%).

Most of the surgeries finished between 60–120 minutes (49.0%), which was nearly half of a total subjects, with the most frequent anesthesia technique used was regional anesthesia, particularly epidural anesthesia (16.6%).

More than half of total subjects were hospitalized in less than one week after surgery (84.1%), with the most widely anesthesia technique used was regional anesthesia, particularly epidural anesthesia (30.5%).

Discussion

The regional anesthesia (55%) was the major option of all subjects rather than general (43%) and combination anesthesia (2%). More than half of a total subjects were performed under regional anesthesia (Table 1).

The results of this study are consistent with literature suggesting that lower extremities

orthopedic surgery is usually performed under regional anesthesia.⁴ Regional anesthesia was shown to have lower complication and mortality incidences.⁵ Furthermore, the systemic effects from drugs, respiratory depression, aspiration risks, and complications after major surgery, particularly orthopedic surgery, can be reduced. Equipment and cost involved are also much less than other anesthesia techniques.⁶ Surgery performed under regional anesthesia is the one option, with lowest risk surgery with the goal of patient safety. These benefits might be the reason why regional anesthesia tends to be performed in this study.

The regional anesthesia used most frequently in this study was epidural anesthesia (63.86%). Epidural anesthesia proved that it could reduce the incidence and severity of perioperative physiologic disturbance and postoperative morbidity.⁷

Subjects in the study had a diverse age range. The youngest subject was one year old patient, and the oldest was 87 years old patient. Of a total 151 subjects, there were 111 subjects (73.51%) in adult group (≥ 18 years old) and 40 subjects (26.49%) in children group (< 18 years old). One study in Netherlands⁸ also showed that lower extremities problems complain more in adults. There is a propensity to use epidural anesthesia rather than other techniques in adult group. This may be caused by all the benefits. In children, general anesthesia is the main option in performing lower extremities surgery. Children who are usually extremely anxious or afraid and cognitively immature, will be best handled by using general anesthesia technique during surgery.⁹

There were 99 (65.56%) male and 52 (34.44%) female subjects. Number of male subjects who exceeded half of a total subjects did not show any particular trend in selection of anesthesia technique, but only showed that there were more male subjects in number than female subjects who underwent lower extremities orthopedic surgery. It might be caused by the number of fractures because traffic accidents victims were mostly males.

Of a total 151 subjects who underwent lower extremities orthopedic surgery, there were 58 cases (38.41%) performed on leg region. Leg region lies between knee and distal leg. It includes tibia and fibula bones. The narrowest part of shaft tibia, the junction of its middle and inferior thirds, is the most frequent site of fracture. Moreover, because its anterior surface is subcutaneous, tibial shaft is the most common site for compound

fracture.¹⁰ Fibula fracture cases are usually caused by combination between tibia and ankle fractures.¹⁰ Because of all the benefits, patients undergoing leg region surgery also tended to use epidural anesthesia.

Ninety subjects (59.6%) were ASA 1 category patients who mostly performed under general anesthesia during the surgery. Risks of complication due to general anesthesia were increasing in higher ASA score category. General anesthesia performed in patients do not have lung disease, heart disease, certain organ failure, and elderly patients.¹¹ It means general anesthesia is better given in healthy and cooperative patients, that is patients with ASA 1 category. Patients with ASA 1 category are healthy patients with no psychological nor organic disease, as well as pathological process which becomes the reason for undergoing localized surgery and do not cause systemic disruption.⁶ Selection of techniques and drugs of anesthesia is performed by anesthetists based on multifactorial assessment and also both patient and surgeon preferences. Physical condition and patient's general health is the most important consideration. The most common scoring system to classify the patient's physical status according to ASA is used. Patients who classified in a higher score category have a higher risk of perioperative mortality.⁶ Therefore, to know the physical status of the patients before selecting an appropriate anesthesia technique is very important to avoid complications.

Trauma, which is one of orthopedic surgery scope, was the most cases in this study. There were 106 trauma cases (70.20%) of a total 151 cases. Most of trauma cases were performed under regional anesthesia. Trauma is often caused by traffic accident¹² and traffic accidents become the major cause of death in the world. Passengers, drivers, or even pedestrians can be the victims. The causes of all are due to the increasing number of vehicles, the lack of public awareness in obeying traffic rules, the poor safety procedure, and the low safety driving training.¹³ Traffic injury cases occupy more than 50% beds in many hospitals. An orthopedic surgeon commits in handling orthopedic cases and trauma musculoskeletal. Scope of orthopedic surgery is not only limited to bones and joints, other structures such as muscles, tendons, ligaments, bursa, synovial, nerves and blood vessels are also handled by orthopedic surgeons.¹²

There were 74 subjects (49.01%) undergoing surgery in 60 to 120 minutes. This group was the largest group with nearly half of

a total subjects. They were performed under regional anesthesia at most, particularly epidural anesthesia (16.56%). Length of surgery under epidural anesthesia can be extended by adding dose through inserted epidural catheter.¹⁴

Patients who have undergone any surgery usually need hospitalization for recovery. Most of subjects (84.11%) in this study stayed for less than a week after surgery. Anesthesia technique used in subjects with hospital length of stay less than a week was mostly regional anesthesia, particularly epidural anesthesia (30.46%). Memtsoudis¹⁵ suggested that there is association between anesthesia used and hospital length of stay. More patients receiving general anesthesia have a prolong length of hospital stay. Study in Washington⁷ also suggested that surgeries performed under regional anesthesia are decreased in hospital length of stay rather than under general anesthesia.

In conclusion, regional anesthesia is the most frequently technique used in patients undergoing lower extremities orthopedic surgery at Dr. Hasan Sadikin General Hospital from January–June 2013, with epidural anesthesia as the most common regional technique used due to all the benefits.

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