

Comparison of Anesthetic Administration According to Method of Hip Surgery

Kalça Cerrahisi Yöntemine Göre Anestezi Uygulamalarının Karşılaştırılması

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ABSTRACT

Objective: The aim of this study is to compare total hip prosthesis (THP), partial hip prosthesis (PHP), and proximal femoral nail (PFN) patients in terms of the chosen anesthetic method.

Methods: A total of 850 patients who underwent hip surgery were divided into 3 groups according to the operation type: PHP (n=281), PFN (n=393), and THP (n=176). The type of anesthesia administered, interventions during anesthesia, and complications were retrospectively evaluated. The groups were compared in terms of patient age, American Society of Anesthesiologists (ASA) scores, chosen anesthetic method, operation duration, colloid use during operation, use of antihypertensive medication, use of vasoconstrictor medication, development of hypotension, blood transfusion administered, development of cardiac arrest, requirements for intensive care after operation, and use of a central catheter.

Results: In the THP group, the mean age of patients was significantly lower as compared to the PHP and PFN groups. The duration of operation was lower in the PFN group as compared to the other two groups. In the THP group, general anesthesia was significantly high, while in the PFN group, regional anesthetic administration was high. While colloid use was greater in the PFN group, the blood transfusion rate was higher in the THP group. The use of antihypertensive medication was higher in the THP group as compared to the other groups.

Conclusion: Although all three anesthetic methods could be used in hip surgery, the type of anesthesia should be chosen according to the type of hip surgery considering the duration of operation, age of the patient, and blood lost during the operation.

Keywords: Hip prosthesis, general anesthesia, hip surgery, proksimal femoral nail, spinal anaesthesia, partial hip prosthesis, total hip arthroplasty

ÖZ

Amaç: Bu çalışmanın amacı, total kalça protezi (TKP), Parsiyel kalça protezi (PKP), Proksimal femoral çivi (PFN) uygulanan hastaların seçilen anestezi yöntemine göre karşılaştırılmasıdır.

Gereç ve Yöntem: Kalça cerrahisi uygulanan 850 hasta; operasyon çeşidine göre; PKP (n=281) grubu ve PFN (n=393) grubu ve TKP (n=176) grubu olarak üçe ayrılarak uygulanan anestezi tipleri, anestezi sırasında yapılan girişimler ve oluşan komplikasyonlar açısından retrospektif olarak değerlendirildi. Gruplar; hastaların yaşı, American Society of Anesthesiologists (ASA) skorları, seçilen anestezi yöntemi, operasyon süreleri, operasyon sırasındaki kolloid kullanımı, antihipertansif ilaç kullanımı, vazokonstriktör ilaç kullanımı, hipotansiyon gelişimi, kan transfüzyon uygulamaları, kardiyak arrest gelişimi, ameliyat sonrası yoğun bakım gereksinimi ve santral kateter uygulanması açısından karşılaştırıldı.

Bulgular: TKP grubunda hastaların yaş ortalaması PKP ve TFN grubundan anlamlı olarak düşük bulunmuştur. PFN grubunda operasyon süresi diğer iki gruptan düşük bulunmuştur. TKP grubunda genel anestezi uygulaması, PFN grubunda ise regional anestezi uygulamaları anlamlı olarak yüksek bulunmuştur. PKP grubunda kolloid kullanımı fazla iken, TKP grubunda kan transfüzyonu uygulanma oranı daha yüksek bulunmuştur. TKP grubunda antihipertansif kullanımı diğer gruplara oranla daha yüksektir.

Sonuç: Üç yöntem de kalça cerrahisinde uygulanabilmesine rağmen, anestezi uygulamasının çeşidi; operasyonun süresi, hastanın yaşı ve operasyondaki kan kaybı gözönünde bulundurularak, cerrahinin tipine göre seçilmelidir.

Anahtar Kelimeler: Kalça protezi, genel anestezi, kalça cerrahisi, proksimal femoral çivi, spinal anestezi, parsiyel kalça protezi, total kalça protezi

Introduction

A variety of surgical procedures in hip surgery are performed under regional or general anesthesia. The factors affecting the selection of anesthesia are characteristics of the patient, experience of the anesthetist, patient's preference, surgeon's preference, duration of operation, and contraindications to general or regional anesthesia.

Total hip prosthesis (THP), partial hip prosthesis (PHP), and proximal femoral nail (PFN) are surgical techniques used in hip surgery. All the three surgeries have different characteristics in a number of ways. The anesthetic method used in hip surgery, selected according to patient characteristics and choice in addition to the type of operation, may be beneficial to reduce postoperative complications and mortality. When articles related to this topic to date were perused, there was no retrospective study comparing cases according to the operation type.

The aim of this study is to retrospectively compare 850 cases that underwent THP, PHP, and PFN treatments according to the chosen anesthetic method.

Materials and Methods

Ethics committee approval was received for this study from the ethics committee of Okmeydanı Training and Research Hospital. A total of 850 patients who underwent hip surgery from August 2011 to December 2014 were divided into 3 groups according to the operation type: PHP (n=281), PFN (n=393), and THP (n=176) (Table 1). The type of anesthesia administered, interventions during anesthesia, and complications were retrospectively evaluated. Patients with metastatic cancer or multiple injuries were excluded. The groups were compared in terms of patient age, American Society of Anesthesiologists (ASA) scores, chosen anesthetic method, operation duration, colloid use during operation, use of antihypertensive medication, use of vasoconstrictor medication, development of hypotension, blood transfusions administered, development of cardiac arrest, requirements for intensive care after operation, and additional invasive interventions (central venous pressure catheter insertion). Analysis was completed using the Statistical Package for Social Sciences 22.0 (SPSS Inc., Chicago, IL, USA) program.

Results

A total of 389 patients were administered spinal anesthesia; 189 patients, combined spinal-epidural anesthesia; and 272 patients, general anesthesia (Table 2). There was no significant

Table 1. Comparison of the type of anesthesia between groups

		PHP		THP		PFN		Total	P
		Number	%	Number	%	Number	%		
Type of anesthesia	General anesthesia	84	30	102	58	86	22	272	0.000
	Combined spinal and epidural anesthesia	76	27	35	20	78	20	189	
	Spinal anesthesia	121	43	39	22	229	58	389	

THP: total hip prosthesis; PHP: partial hip prosthesis; PFN: proximal femoral nail

Table 2. Comparison of age, sex, operation time, and ASA between groups

		PHP	THP	PFN	p
Number of patients	850	281	176	393	
AGE (mean±SD)		73.5±16.2	60.1±21.1	73.6±16.7	0.012
Sex	Male %	%37	%34	%46	0.190
	Male number	104	60	180	
	Female %	%63	%66	%54	
	Female number	177	116	213	
Operation time (minute) (mean±SD)		150.2±44.949.2‡	164.8±52.9	119.1±49.2**	0.000
ASA		3	2.25	3.25	

Kruskal-Wallis (Mann-Whitney U test)/Chi-square test
 **Difference with PHP group p<0.05/‡difference with THP group p<0.05
 THP: total hip prosthesis; PHP: partial hip prosthesis; PFN: proximal femoral nail; ASA: American Society of Anesthesiologists

difference found between the cases in terms of ASA or gender. In the THP group, the mean age of patients was found to be significantly lower than that in the PHP and TFN groups. The duration of operation was lower in the PFN group as compared to the other two groups. In the THP group, the use of general anesthesia was significantly high, while in the PFN group, regional anesthetic administration was high. While colloid use was greater in the PFN group, the blood transfusion rate was higher in the THP group. The use of antihypertensive medication was higher in the THP group as compared to the other groups. There was no significant difference found between the groups in terms of postoperative intensive care requirements. In the PFN group, 4 patients developed cardiac arrest during the operation. In the THP group, a central venous catheter was inserted in only 4 patients. For THP cases, higher rates of sedation were administered during regional anesthesia (Table 3).

Discussion

THP is an effective treatment frequently used to treat late-stage hip osteoarthritis and rarely delayed hip fracture cases [1]. Studies have shown that advanced age, high ASA score, cardiovascular diseases, pulmonary diseases, and diabetes mellitus increase postoperative complications and mortality in these patients [1]. Total hip arthroplasty is performed either with regional anesthesia or with general anesthesia,

which is dependent on the discretion of the anesthesiology team, surgeon's preference, and patient's choice. Regional anesthesia has been hypothesized to decrease postoperative complications by reducing sympathetic activation and inflammation, by preventing venous stasis, and by avoiding tracheal intubation and positive ventilation [1]. Deep vein thrombosis and pulmonary embolism following total hip arthroplasties done with general anesthesia are found at lower rates than with those done with general anesthesia [1]. There are studies showing that regional anesthesia in total hip arthroplasty reduces the need for blood transfusions [2, 3]. General anesthesia with controlled hypotension also significantly reduces blood loss. Following hip fracture surgery under spinal anesthesia, patients exhibit better oxygenation in the early postoperative period than those after general anesthesia. The frequency of postoperative confusion is unrelated to the anesthetic technique. The incidence of deep vein thrombosis is reduced following spinal anesthesia when compared with general anesthesia. However, the mortality rate at the first month of the surgery is independent of the anesthetic technique. Spinal, epidural, and general anesthesia techniques have been successfully used for total hip arthroplasty [4].

Partial hip prosthesis and PFN techniques are appropriate methods for the treatment of hip fractures. Studies have revealed that greater

Table 3. Comparison of sedation requirement, colloid requirement, antihypertensive drug requirement, vasoconstrictor drug requirement, hypotension, blood transfusion application, cardiac arrest during operation, need for intensive care unit after operation, number of patients sent to the intensive care unit with intubation, and number of central catheter applications between groups

		PHP		THP		PFN		P
		n	%	n	%	n	%	
Sedation	No	180	64	127	72	240	61	0.309
	Yes	101	36	49	28	153	39	
Colloid requirement	No	112	40	79	45	224	57	0.032
	Yes	169	60	97	55	*169	43	
Antihypertensive drug requirement	No	264	94	157	89	389	99	0.011
	Yes	17	6	19	11	‡4	1	
Vasoconstrictor drug requirement	No	250	89	151	86	338	86	0.729
	Yes	31	11	25	14	55	14	
Hypotension	No	199	71	113	64	310	79	0.063
	Yes	82	29	63	36	83	21	
Blood transfusion	0	‡250	89	121	69	‡369	94	0.000
	1	31	11	49	28	24	6	
	2	0	0	6	3	0	0	
Cardiac arrest	No	281	100	176	100	389	99	>0.05
	Yes	0	0	0	0	4	1	
Intensive care requirement	No	273	97	167	95	377	96	0.822
	Yes	8	3	9	5	16	4	
Central catater	No	281	100	172	98	393	100	>0.05
	Yes	0	0	4	2	0	0	
intensive care requirement with entubation	No	278	99	172	98	381	97	>0.05
	Yes	3	1	4	2	12	3	

Chi-square test/Fischer test/*Difference with PHP group p<0.05/‡difference with THP group p<0.05
THP: total hip prosthesis; PHP: partial hip prosthesis; PFN: proximal femoral nail

for patients with fractured hips. These patients generally have higher ASA scores; it should be noted that they are elderly patients. Lowering the amount of local anesthetic used will prevent the development of hypotension [11]. Thus, while life-threatening hypotension is not observed, tolerable hypotension formed by regional anesthesia will both reduce the amount of bleeding and reduce the requirements for intraoperative antihypertensives in hypertensive patients. In our study, patients in the THP group used more intraoperative antihypertensives. This situation may be linked to the higher rates of general anesthesia administration for THP patients.

Spinal anesthesia administration completed with low-dose local anesthetics can be combined with epidural anesthesia for longer durations. Thus, long-term anesthesia is administered and the complications of spinal anesthesia are both reduced to a minimum.

Sedation is a very important component of patient management when administering regional anesthesia. As the patient is conscious during operations under regional anesthesia, the surgical environment may negatively influence the patient. These effects may be more obvious during orthopedic interventions due to the noise of tools used, long duration of tourniquet use, position given, and manipulation of patient extremities during the surgery. To remove the possibility of such effects, the most appropriate method is to sedate the patient [12]. In our study, a majority of the patients given regional anesthesia was sedated; however, this rate was higher in the THP group. The length of the THP operations, more difficult tolerance by patients, and noisier devices used increase the need for sedation.

This study has several limitations. As a retrospective study, there were many uncontrolled variables. As the retrospective scanning was completed using the anesthesia monitoring forms, records of mortality, morbidity, duration to discharge, and complications in the postoperative period were not found.

Conclusion

The greater use of general anesthesia in THP operations is due to the length of the operation and the low mean age of patients. In elderly patients, the presence of additional diseases and better tolerance mean that regional anesthesia is preferentially chosen. The lower rate of bleeding linked to the operation method in PHP operations is clear from the comparison of replacement colloids, while THP cases require

complications may develop in the elderly age group. In a study researching the mortality of patients after PHP operations, the importance of preoperative clinical situation and the greater mortality rate in elderly patients were particularly emphasized [5]. The mortality of patients undergoing hip surgery is higher for those given general anesthesia as compared to regional anesthesia [6]. In addition, there are studies stating that the chosen anesthetic method had no effect on the mortality or outcome [7]. Bone tissue quality disorders linked to osteoporosis, vitamin D deficiency, and other comorbidities increase the risk of hip fracture in elderly patients [8]. In our study, the mean age of patients given THP treatment was found to be lower than patients undergoing PHP or PFN treatments. This may be linked to the inclusion of operations not just for hip fracture but for coxarthrosis.

Another study found that the duration of operation for PFN cases was shorter than arthroplas-

ties [9]. In our study, accordingly, cases undergoing PFN treatment had shorter duration of operations. PFN is a method that reduces the amount of bleeding in hip fracture operations. The higher blood transfusion administration in THP cases may be linked to the longer duration of this operation as compared to PHP and PFN cases; further, this method is completed with open techniques and requires a more complicated and comprehensive surgical procedure than partial prosthesis. Additionally, it is reported that general anesthesia increases the amount of bleeding in hip surgery [10]. In our study, it appears that general anesthesia was administered mostly in THP cases. In elderly patients, regional anesthesia is better tolerated, while younger patients may reject the procedure at times. In spite of the presence of younger patients in the THP group, the length of the operation is the reason for general anesthesia administration.

The development of hypotension is a frequently observed complication in regional anesthesia

blood transfusions. The requirement for anti-hypertensives is greater for patients that are given general anesthesia; therefore, it was used more in the THP group. The greater use of sedation during regional anesthesia in the THP group may be linked to the long duration of the operation and the younger age of patients. The development of cardiac arrest was observed in the PFN group, which had the highest mean age.

Considering the length of the operation for hip surgery of THP cases, epidural anesthesia combined with spinal anesthesia should be chosen. For PFN and PHP cases, due to the increased age of patients and greater comorbidities, spinal anesthesia with low-dose local anesthetics should be chosen. General anesthesia should be used only for those cases where regional anesthesia is contraindicated or for patients who reject regional anesthesia.

The greater use of general anesthesia during THP operations may be linked to the length of the operation and the low average age of patients. In elderly patients, the presence of additional diseases and good tolerance mean that regional anesthesia is preferentially chosen. The lower rate of bleeding linked to the operation method in PHP operations is clear from the comparison of colloid use, while THP cases required blood transfusions. The requirement for antihypertensives is greater for patients given general anesthesia; therefore, it was used more in the THP group. The greater use of sedation during regional anesthesia in the THP

group may be linked to the long duration of the operation and the younger age of patients. The development of cardiac arrest was observed in the PFN group, which had the highest mean age.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Okmeydanı Training and Research Hospital (date/no: 09-02-2016/415).

Informed Consent: Written informed consent was obtained from patients due to the retrospective nature of our study.

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