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ORIGINAL ARTICLE

# A survey of anesthetic preference and preoperative anxiety in hip and knee arthroplasty patients: the utility of the outpatient preoperative anesthesia appointment

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## Abstract

**Purpose** The general public's perceptions of anesthesia and the risks associated with it may be skewed. The outpatient preoperative appointment with an anesthesiologist allows for patient education regarding different anesthetic options and counseling regarding anxiety related to anesthesia and surgery. This study investigates whether the preoperative appointment for hip and knee arthroplasty alters patient preference for general or spinal anesthesia and reduces patient anxiety.

**Methods** Sixty-two patients undergoing hip or knee arthroplasty were administered two verbal questionnaires at the preoperative clinic. The first questionnaire was completed prior to meeting the anesthesiologist and addressed patient anesthetic preferences, previous anesthetic experiences, and perioperative anxiety and need for information using the Amsterdam Preoperative Anxiety and Information Scale (APAIS). The second questionnaire was completed immediately following the appointment and addressed the patient's anesthetic preference, reasons for any preference changes, and anxiety levels and need for information using the APAIS. The clinic anesthesiologist was blinded to the nature of the study.

**Results** Following the clinic appointment, a significant decrease in patients wanting general anesthesia (from 48 to 18%, $P < 0.001$) and a significant increase in patients wanting spinal anesthesia (from 39 to 76%, 95%, $P < 0.01$) was noted. A significant decrease in overall anxiety and anxiety related to the patients' upcoming surgeries and need for information was also noted.

**Conclusions** The preoperative anesthesia meeting serves an important role in educating patients regarding anesthesia, and can influence patients' choice of anesthetic while also reducing overall patient anxiety.

**Keywords** Regional anesthesia · Preoperative anxiety

## Introduction

The public's perception of the risks associated with different types of anesthetics is often inaccurate [1]. In patients undergoing hip and knee arthroplasty, studies suggest that regional anesthesia is equally effective without increased morbidity when compared to general anesthesia [2]. Yet, many patients are reluctant to choose regional over general anesthesia, even in specific situations where there may be significant advantages of regional anesthesia [3–5]. Additionally, inadequate knowledge regarding anesthesia can contribute to increased preoperative anxiety. This can lead to pathophysiological responses including tachycardia, hypertension, and increased pain, leading to increased anesthetic and analgesic requirements perioperatively [6, 7].

Previous studies investigating patient anesthetic preference indicate that a majority of patients prefer general over

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spinal anesthesia in situations where either would be an appropriate option. Interestingly, anesthesiologists surveyed in these studies reported preferring regional over general anesthesia should they require surgery [8, 9]. A major factor that may affect anesthetic preference is the anesthetic-specific associated fears and anxieties, as patients are understandably concerned about serious yet rare complications related to anesthesia [10]. One study found that 27.3% of patients reported a major concern of permanent paralysis following spinal anesthesia, a complication with a reported occurrence of 0.7–1.8 per 100,000 [1, 11].

The preoperative appointment with the anesthesiologist provides an opportunity for patient assessment and patient education regarding the benefits and risks of different anesthetic options, including general and regional anesthesia. It is an ideal time to obtain informed consent regarding anesthetic choice, and to create an individualized anesthetic plan that considers the patient's preference and the anesthesiologist's perioperative goals for the patient. During the appointment, patients may express their fears and anxieties about their upcoming anesthetic and procedure, and ask any questions they may have. We hypothesized that increased patient education regarding anesthetic options during the preoperative anesthesia assessment will result in more patients choosing spinal over general anesthesia, and in an overall reduction in patient anxiety and need for information.

## Materials and methods

After obtaining approval from the Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board, patients scheduled for elective knee or hip arthroplasty at the Kingston General Hospital or the Hotel Dieu Hospital (KGH/HDH, Kingston, Ontario, Canada) were recruited to the study. Written informed consent was obtained while subjects were in the pre-admission clinic waiting to see the anesthesiologist. All patients undergoing elective hip or knee arthroplasty are routinely seen at the outpatient preoperative clinic. Patients were excluded if they were unwilling or unable to provide informed consent, or had a significant pre-existing psychiatric disorder. Patients included in the study were aged 50 years and older, undergoing knee or hip arthroplasty, and had not been seen by the anesthesiologist prior to the beginning of the study. Data collection occurred during six consecutive, weekly preoperative clinics at HDH, staffed by a different anesthesiologist each week. All eligible clinic patients were recruited to the study, with a total of ten or eleven patients recruited per clinic.

Two questionnaires were developed to determine patient anesthetic preference and to assess patient anxiety regarding their upcoming surgery and anesthetic (see Online Appendices 1, 2). The first questionnaire was administered to each patient while they waited for their appointment and the second questionnaire was administered immediately following their appointment. Both questionnaires were administered verbally to each patient by one investigator, who also recorded patient responses. Standardized verbal explanations of general anesthesia, spinal anesthesia, and sedation were provided to each patient as described in Online Appendix 1. Preoperative assessments and counseling were performed by general anesthesiologists, who were aware of an ongoing survey study, but blinded to the nature of the study. Patients were given explanations of general anesthesia versus spinal anesthesia with or without sedation by the staff anesthesiologist during each appointment. Each staff anesthesiologist described a general anesthetic as entailing an intravenous medication induction rendering a patient unresponsive and unconscious, versus a spinal anesthetic that was described as a single intrathecal injection resulting in a loss of pain sensation in the lower extremities. Sedation for relaxation as an adjunct to spinal anesthesia was reviewed. Risks associated with general and spinal anesthesia were discussed as is routine to do so in the preoperative arthroplasty clinic. Each appointment was approximately 20 min in duration.

The first questionnaire addressed the patient's anesthetic preference, anxiety level, previous history with anesthetics including personal experiences or experiences they knew others to have had, and the source of their anesthesia knowledge prior to their appointment (Online Appendix 1). For those patients who reported any level of anxiety associated with regional anesthesia (score $\geq 2$ on Item 3 of Online Appendix 1), specific concerns with regional anesthesia were rated on a scale of 1–5, (not at all to extremely). Patients rated their level of concern with various anesthesia side effects on the same 5-point scale, and a response of $> 3$ was defined as "significant concern". The six-item Amsterdam Preoperative Anxiety and Information Scale (APAIS) was included in our questionnaire to assess anxiety and patient's need for more information about their upcoming procedure (Online Appendix 1, Item 5) [7]. The APAIS scale was used because it has been validated in the preoperative anesthetic clinic setting, and it correlates with the State-Trait Anxiety Inventory (STAI), which is the gold standard anxiety measurement scale [7, 12, 13]. The APAIS assesses anxiety and the need for information using a series of statements that are rated on a Likert scale ranging from 1 (not at all) to 5 (extremely). Anesthetic anxiety was scored out of 10 (based on APAIS items 1 and 2), and surgical anxiety was scored out of 10 (based on APAIS items 4 and 5). Overall anxiety was scored out of 20 (sum of APAIS item 1, 2, 4, and 5 scores). The desire for more information about the anesthetic and the surgical procedure was scored out of 10 (based on APAIS items 3 and 6).

The second questionnaire was used to determine the patient's anesthetic choice and anxiety level following the meeting with the anesthesiologist (Online Appendix 2). If the patient preferred a different type of anesthetic after the appointment, the reasons for this were determined. To assess any changes in anxiety level, the patients were asked to rate the same statements from the first questionnaire, including the APAIS (Online Appendix 2, Item 4), with slight modifications in the wording to remain applicable following the appointment with the anesthesiologist.

Since there are no published reports of patient anesthetic preference before versus after meeting the anesthesiologist, effect sizes could not be obtained from the literature. Instead, an estimated effect size was calculated based on Sosis et al. who found that 20% of patients preferred spinal anesthesia [8]. Based on clinical observation, it was assumed that those preferring spinal anesthesia would increase to 45% following the appointment with an anesthesiologist, thus an effect size of 0.25 was estimated. For this study, 62 patients per group were estimated to provide an 80% likelihood of detecting a significant difference with a two-sided significance level set at 0.05. SPSS version 8 was used for statistical analyses. Preferences for anesthesia, and concern about side effects before and after the appointment were compared using Pearson's Chi square tests followed by Fisher's exact test (two sided). The pre- versus post-clinic anxiety scores were compared using paired *t* tests. Descriptive statistics were used for demographic variables. Other factors such as reasons for patient preference for certain types of anesthetics and adverse effects of previous anesthetics were reported qualitatively.

## Results

Demographic data for the 62 patients in this study are presented in Table 1.

Compared to anesthetic preference before meeting an anesthesiologist, patient preference for general anesthesia decreased significantly from 30/62 to 11/62 ($\chi^2 = 14$, $P < 0.001$), and patient preference for regional anesthesia increased significantly from 24/62 to 47/62 ($\chi^2 = 12$, $P < 0.01$) following the clinic appointment (Fig. 1). Fifty-five percent of participants reported that meeting with the anesthesiologist influenced their choice of anesthetic. Amongst these patients, 47% indicated they had changed their mind because they were now more knowledgeable about the anesthetic choices available to them. The second most common reason for a preference change was "medical safety" as discussed during their appointment (41%), followed by patient-specific "medical reasons" (29%).

Results from the APAIS portion of the questionnaires are shown in Fig. 2. Overall anxiety decreased after meeting with the anesthesiologist ($t = 2.5$, $p = 0.02$). Additionally, anxiety related to patients' upcoming surgeries and the need for more information about the anesthetic and surgery both decreased after the clinic appointment compared to pre-appointment scores (surgical anxiety: $t = 3.3$, $p < 0.01$; need for more information: $t = 8.3$, $p < 0.001$). However, there was no change in anesthesia-associated anxiety scores following the appointment with an anesthesiologist ($t = 1.0$, $p = 0.32$).

Patients who rated their level of concern about regional anesthesia as $\geq 2$ on a 5-point Likert scale went on to rate their specific concerns about regional anesthesia (Online Appendix 1, Item 4). The frequency of these patients who rated the level of their concern as greater than 3 on a 5-point Likert scale (that is, "significant concern") for each item is shown in Fig. 3. A score of $> 3$ for "other" factors was expressed by three individuals, and included hearing surgeons talking and having medical allergies not being respected.

**Table 1** Patient characteristics

| | |
|---|---|
| Age (mean years ± SD) | 62 ± 10 |
| Sex (*n* male/*n* female) | 27/35 |
| BMI (kg/m$^2$) (mean ± SD) | 32 ± 7 |
| ASA physical status (n I/II/III/IV/V) | 0/23/37/2/0 |
| Surgery *n* (%) | |
| Total knee arthroplasty | 27 (43) |
| Total hip arthroplasty | 29 (47) |
| Revision total knee arthroplasty | 3 (5) |
| Revision total hip arthroplasty | 3 (5) |

*BMI* Body mass index, *ASA* American Society of Anesthesiologists

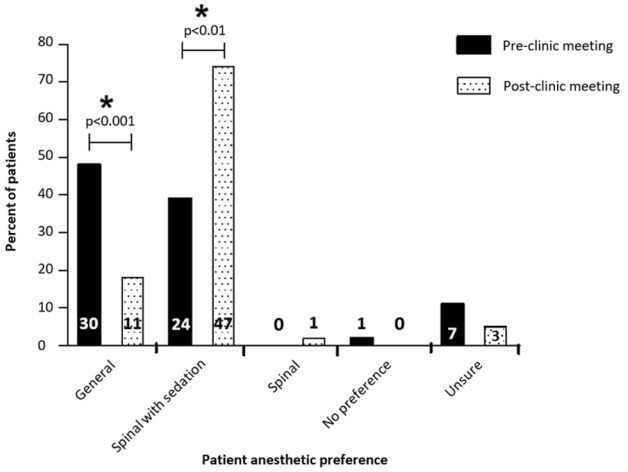


**Fig. 1** Patient preference for general and spinal anesthesia prior to and following the appointment with the clinic anesthesiologist. Sample size is denoted for each group on the bars ($n = 62$)

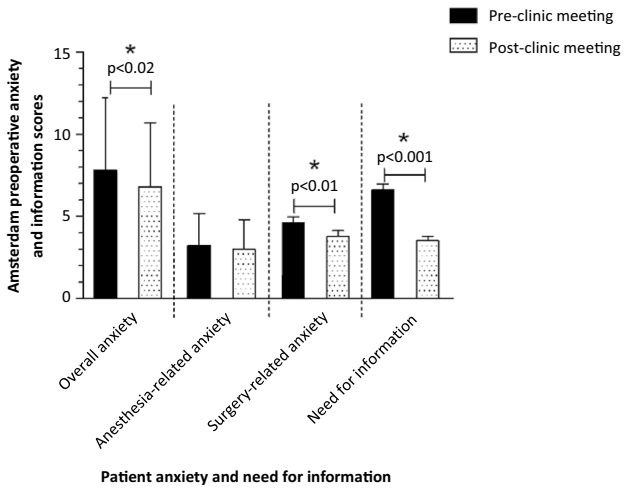


**Fig. 2** Patient anxiety, quantified using the APAIS, before and after meeting with the anesthesiologist. "Overall anxiety" was scored out of 20; the other three categories were scored out of 10

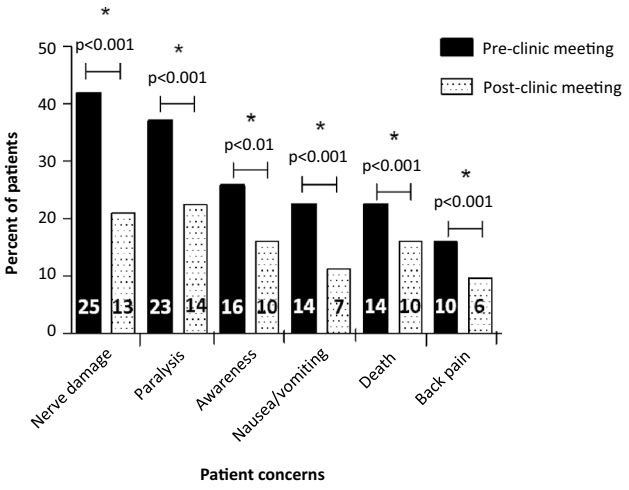


**Fig. 4** Proportion of patients who reported being highly concerned about potential complications with anesthesia. All patients rated each complication on a scale of 1–5 (not at all to extremely). A score of >3 was considered high anxiety and included in the figure above. Sample size is denoted for each group on the bars ($n=62$)

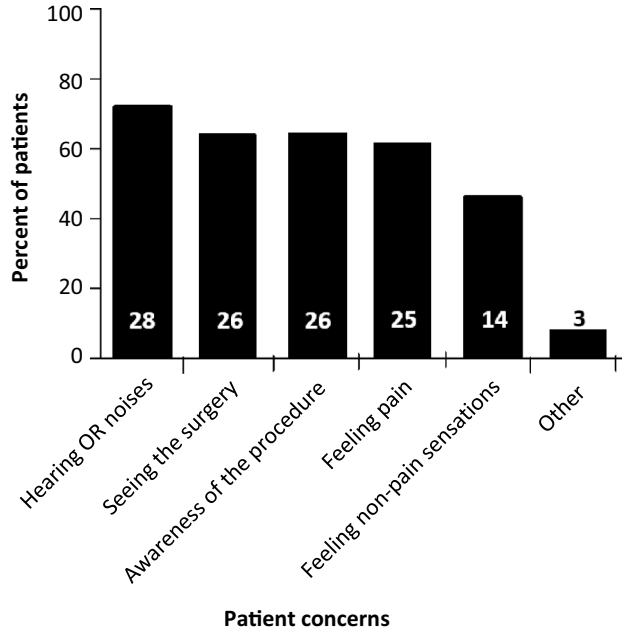


**Fig. 3** Specific factors that concern patients with respect to regional anesthesia. Only subjects who expressed concern regarding regional anesthesia (score ≥2) were asked to answer this part of the questionnaire ($n=39$). Sample size is denoted for each group on the bars

The proportion of patients who reported significant concern (>3 on a 5-point Likert scale) for each potential anesthetic side effect (Online Appendix 1, Item 6) is shown in Fig. 4. Patients' level of concern with each potential side effect listed decreased following their appointment with the anesthesiologist: nerve damage ($\chi^2=45$, $p<0.001$), paralysis ($\chi^2=48$, $p<0.001$), being aware during operation ($\chi^2=33$, $p<0.01$) nausea and vomiting ($\chi^2=48$, $p<0.001$), death ($\chi^2=87$, $p<0.001$) and back pain ($\chi^2=42$, $p<0.001$). No patient rated "sore throat" as a significant concern. Nerve damage and paralysis were rated as the most common significant concern (42% and 38% of respondents, respectively), prior to meeting with the anesthesiologist, while awareness and death were less common (26% and 23%, respectively). Patients were also given the option to specify any other worrisome potential side effects; only one individual expressed an additional major concern, and this was with respect to asthma exacerbation.

We also examined patients' previous experiences with anesthetics to determine if this may have influenced their anxiety levels. Many patients reported having previously had more than one type of anesthetic. Overall, 97% reported having previously received general anesthesia, 35% reported having had spinal anesthesia with sedation, and 21% reported having had spinal anesthesia without sedation. A previous negative reaction from any type of anesthetic was reported by 38% of the patients, and most commonly included nausea and vomiting and a long postoperative recovery time. Additionally, 43% of patients reported knowing someone who had a negative experience while under anesthesia, with the most common experience reported as unsuccessful surgery; however, this was related to the procedure itself rather than the anesthetic. Other reported negative effects experienced by others included nausea and vomiting, back problems following surgery, adverse drug reactions, need for resuscitation during surgery, and death while in the operating room. Of note, amongst those who reported knowing someone who had a negative experience, over 90% reported that this did not influence their choice of anesthetic.

Finally, when patients were asked where they had obtained most of their anesthesia information prior to the appointment, the majority (61%) reported receiving it from their health care providers, specifically their family doctors and orthopedic surgeons. When asked to rate their level of satisfaction with the information they received regarding anesthetics during their present appointment with the anesthesiologist, 93% of the patients reported feeling extremely satisfied.

## Discussion

The results of this study indicate that patient anesthetic preference and anxiety levels can be influenced by the preoperative appointment with the anesthesiologist. We found that the proportion of patients preferring spinal anesthesia increased, while the proportion of patients preferring general anesthesia decreased, following the preoperative appointment. Amongst patients who preferred a different anesthetic after their appointment, 47% stated that being educated by the anesthesiologist about their anesthetic options was the reason for their preference change. In addition, we found that patient anxiety levels were decreased following the preoperative meeting with an anesthesiologist.

Previous investigations indicate the importance of patient education on influencing patient anesthetic preference. The use of informational websites outlining anesthetic options can increase patient preference for regional over general anesthesia prior to hip or knee surgery [14]. In the current study, rather than patients educating themselves with recommended resources, the information was delivered to the patients via the clinic anesthesiologist, and a similar increase in preference for spinal anesthesia was found.

There are several reasons why patients may be initially reluctant to choose spinal over general anesthesia. The idea of being "awake" during a major surgery may be unappealing to them. This, coupled with anecdotal accounts from relatives and friends about rare complications including permanent paralysis, may discourage patients from considering regional anesthesia as an option for surgery [1, 8, 9]. In our investigation, although 43% of patients reported knowing someone who had a negative experience while under anesthesia, over 90% of these patients reported that this did not influence their anesthetic preference. Another factor that may influence a patient's anesthetic preference is their past experiences with anesthesia and surgery. There are various reports in the literature on what effect, if any, this can have on a patient's anesthetic choice. One study concluded that patients tend to prefer the type of anesthetic they have previously received and are familiar with [9]. On the other hand, another study found that the total number of previous anesthetics of any type that a patient had been given did not influence whether they preferred spinal or general anesthesia [8]. In addition to the reservations some patients may have about spinal anesthetics and their past experiences with anesthetics, many patients are simply unaware of the anesthetic options that exist and are surprised to learn that regional anesthesia is an option for extensive procedures [1].

Fear of rare but serious adverse events can influence patient anesthetic preference. Interestingly, in our study more patients had significant concerns regarding nerve damage and paralysis compared to other serious adverse events such as awareness or death. The significant reduction in patient concerns after the appointment with the anesthesiologist likely attests to reassurance provided by the clinic anesthesiologist regarding rarity of serious adverse events. However, this was not formally tested in our survey. Other studies have previously reported that the general population is often concerned about rare, serious complications rather than more common side effects [10, 15].

Finally, since patients have established relationships with their surgeons prior to meeting with an anesthesiologist, it is possible that patients may be influenced by the anesthetic recommendation of their surgeon. While opinions on regional anesthesia widely vary amongst orthopedic surgeons, one survey suggests that amongst the 48% who report directing their patients' choice of anesthetic prior to surgery, 84% direct their patients to choose a regional technique when possible [16]. All of our patients had already been assessed by the orthopedic surgical team, which may have influenced their initial anesthetic preference. However, we did not formally ask about this in our surveys.

Our results also suggest that patient anxiety is reduced following the meeting with the anesthesiologist, supporting the findings of previous studies in this area. A significant decrease in surgery-related anxiety, and overall anxiety (combination of surgery- and anesthesia-related anxiety) was found following the appointment; however, anesthesia-related anxiety did not change. A possible explanation for this is that the level of anesthesia-associated anxiety prior to the appointment was low to begin with since patients were already in the waiting room about to discuss their anesthetic with the anesthesiologist. If the initial questionnaire had been administered in a different context, patient anxiety levels before the preoperative anesthetic appointment may have been higher, which could have afforded us the power to detect a change in anxiety after the appointment. Patient anxiety about anesthesia is an important factor for anesthesiologists to consider, since anxious patients have different physiological and psychological responses to perioperative stress compared to non-anxious patients [6, 16, 17].

A dilemma may arise with the patient who does not desire a high degree of anesthesia-related information, yet has a high degree of anxiety as assessed by a pre-anesthetic anxiety scale. In these situations, the amount of information

provided to the patient is often at the discretion of the physician, although there is evidence to suggest that information should be given to all patients with high anxiety scores regardless of their degree of desire for information [18]. Various educational tools including concise brochures and short films can reduce preoperative patient anxiety [19, 20]. In busy clinics where the anesthesiologist may not have time to fully alleviate a patient's fears and anxieties, having such tools available may be beneficial.

A limitation of this study was our inability to standardize the information imparted to study participants by the anesthesiologist in clinic, since data was collected in clinics staffed by six different anesthesiologists. While this may reflect a more realistic summary of information provided to patients in our clinics, we acknowledge that there may have been variability in the information exchanged between the anesthesiologists and patients. While all staff anesthesiologists reviewed the options of general versus spinal anesthesia with or without sedation with each of their patients, the exact explanations of each anesthetic and its associated risks and benefits may have differed depending on the anesthesiologist in clinic. Further, we cannot comment on the objectivity with which the anesthetic options were presented in patients who had no contraindications to either technique. Similarly, patients may have received variable information regarding anesthesia from other health care providers involved in their preoperative care, including their orthopedic surgeons and family doctors. In our study, the second questionnaire was purposely administered immediately after the appointment to capture the specific influence of the clinic anesthesiologist, and to eliminate any confounding sources which may have influenced patient preference prior to their surgery. However, we acknowledge that patients may have received more information from other sources following their appointment that may have ultimately affected their anesthetic preference on the day of surgery. Finally, we recognize that while it is routine for all patients undergoing joint arthroplasty at our institution to attend pre-surgical screening clinics, this is not routine practice at all institutions. With respect to the survey itself, we note that while our goal was to use neutral questions to quantify anxiety, use of the standardized APAIS may have resulted in some leading questions given the wording of the scale. For instance, the wording of the questions may have suggested to patients that they should have concern or worry regarding their anesthetic in situations where this may not have been the case.

The preoperative anesthesia appointment achieves the important goal of educating patients regarding their upcoming perioperative course. The results of our study demonstrate that the appointment with the anesthesiologist can influence patient anesthetic choice and reduce anxiety levels. The appointment serves as an opportunity for informed patient consent regarding anesthetic choice after assessment of the patient and addressing any concerns they may have. This facilitates a means for providing an informed and individualized anesthetic plan based on shared decision-making amongst the patient and anesthesiologist.

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## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

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