

## Explore The Technique of Peripheral Anesthesia and Its Relationship with Ultrasound Utilization from the Perspectives of Physicians and Anesthesiologists

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### استكشاف تقنية التخدير الطرفي وعلاقتها باستخدام الموجات فوق الصوتية من وجهة نظر الأطباء وأطباء التخدير

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#### Abstract:

The article discusses peripheral anesthesia, also known as regional anesthesia, which specifically targets nerves to numb particular areas of the body. The study aimed to explore the technique of peripheral anesthesia and its association with ultrasound use from the perspectives of doctors and anesthesiologists. A total of 34 participants were involved in the study, with data collected from medical professionals in various settings, including private and public clinics and hospitals, through a specially designed questionnaire. Results indicated that 41.2% of participants specialized in human medicine, while 38.2% had 5 to 10 years of experience. Potential contraindications for peripheral anesthesia, such as brain tumors, infections, or significant blood loss, were identified with a mean score of 2.26 and a standard deviation of 0.89. The study also found that peripheral anesthesia is perceived as risk-free for patients, with a mean score of 2.17 and a standard deviation of 0.83. A strong positive correlation (0.42,  $p = 0.007$ ) was noted between the perceptions that peripheral anesthesia does not cause side effects post-operation and that it poses no risks to patients. The study concluded that while peripheral anesthesia is one of the safest anesthesia methods, its application remains limited due to the novelty of the specialty and the complexity of the procedures. The authors recommended increasing attention to peripheral anesthesia to help mitigate the risks associated with general anesthesia and to fully leverage its benefits.

**Keywords:** Peripheral Anesthesia, Anesthesiologists, Ultrasound technique.

#### المخلص

يتناول المقال التخدير الطرفي، المعروف أيضًا بالتخدير الإقليمي، والذي يستهدف الأعصاب بشكل خاص لتخدير مناطق معينة من الجسم. هدفت الدراسة إلى استكشاف تقنية التخدير الطرفي وعلاقتها باستخدام الموجات فوق الصوتية من وجهة نظر الأطباء وأطباء التخدير. شمل البحث 34 مشاركًا، وتم جمع البيانات من المتخصصين الطبيين في بيئات مختلفة، بما في ذلك العيادات والمستشفيات الخاصة والعامة، من خلال استبيان مصمم خصيصًا لهذا الغرض. أظهرت النتائج أن 41.2% من المشاركين تخصصوا في الطب البشري، بينما كانت نسبة 38.2% منهم لديهم خبرة تتراوح بين 5 و10 سنوات. تم تحديد موانع الاستخدام المحتملة للتخدير الطرفي، مثل الأورام في الدماغ، والعدوى، أو فقدان الدم الكبير،

بمتوسط درجة 2.26 وانحراف معياري 0.89. كما وجدت الدراسة أن التخدير الطرفي يُعتبر خاليًا من المخاطر بالنسبة للمرضى، بمتوسط درجة 2.17 وانحراف معياري 0.83. تم ملاحظة علاقة إيجابية قوية ( $p = 0.007$ , 0.42) بين التصورات التي تفيد بأن التخدير الطرفي لا يسبب آثارًا جانبية بعد العملية وأنه لا يشكل مخاطر على المرضى. استنتجت الدراسة أنه على الرغم من أن التخدير الطرفي يُعتبر من أكثر طرق التخدير أمانًا، إلا أن تطبيقه لا يزال محدودًا بسبب حداثة التخصص وصعوبة الإجراءات. أوصى المؤلفون بزيادة الاهتمام بالتخدير الطرفي للمساعدة في التخفيف من المخاطر المرتبطة بالتخدير العام واستغلال فوائده بشكل كامل.

**الكلمات المفتاحية:** التخدير الطرفي، أطباء التخدير، التقنية الموجات فوق الصوتية.

## Introduction

Peripheral anesthesia, also known as regional anesthesia, is a type of anesthesia that targets specific nerves or nerve groups to numb a particular area of the body. This technique is commonly used for surgical procedures in which only a specific part of the body needs to be anesthetized. Peripheral anesthesia can be administered through various methods, such as nerve blocks, where medication is injected near the targeted nerve or nerve cluster. This blocks the transmission of pain signals from that area to the brain, resulting in numbness and pain relief (Kapral et al., 2008).

One common example of peripheral anesthesia is a peripheral nerve block for a limb surgery, such as an arm or leg. The anesthesiologist identifies the specific nerves responsible for sensation in the surgical site and injects an anesthetic medication near those nerves. This leads to temporary loss of sensation in the area, allowing the surgeon to perform the procedure without the patient feeling any pain (Perlas et al., 2008).

Advantages of peripheral anesthesia include reduced overall anesthesia requirement, decreased risk of systemic side effects, and better postoperative pain control. It can also provide a safer alternative for patients who may not tolerate general anesthesia due to various medical conditions. However, peripheral anesthesia also has potential risks and complications, such as nerve damage, infection at the injection site, bleeding, or allergic reactions to the medications used. These risks are generally low but should be discussed with the anesthesiologist before the procedure (Williams et al., 2003).

Ultrasound technology is often utilized to assist in performing peripheral anesthesia. Ultrasound uses high-frequency sound waves to create real-time images of the body's internal structures (Assmann et al., 2007). The using ultrasound guidance, healthcare providers can accurately locate the nerves they need to target for anesthetic administration (Antonakakis et al., 2007). During the procedure, the ultrasound device is placed on the patient's skin near the target area. The sound waves then penetrate the body and bounce back to create an image on the ultrasound monitor, showing the nerves, blood vessels, and surrounding tissues. This helps the anesthesiologist precisely identify the desired nerve and plan the injection accordingly (Sites et al., 2008).

The use of ultrasound in peripheral anesthesia offers several benefits. It allows for increased accuracy and safety by ensuring that the anesthetic is precisely delivered to the intended area. This technique significantly reduces the risk of unintentional nerve damage, as the anesthesiologist can visualize the nerve pathway and avoid any potential complications. Additionally, ultrasound guidance enhances the success rate of peripheral nerve blocks, leading to improved patient outcomes and satisfaction (Boezaart, 2006). This study was aimed to shed light on the technique of peripheral anesthesia and its relationship to the use of ultrasound, according to The Perspective of Physicians and Anesthesiologists.

## Material and methods

### Study sample and duration:

The sample for this study consisted of 34 participants who were included in this study during the period from June to September 2023.

### Data collection:

Data for this study were collected from doctors, anesthesia specialists and technicians in private and public clinics and hospitals through a questionnaire prepared specifically for this study.

### Data analysis

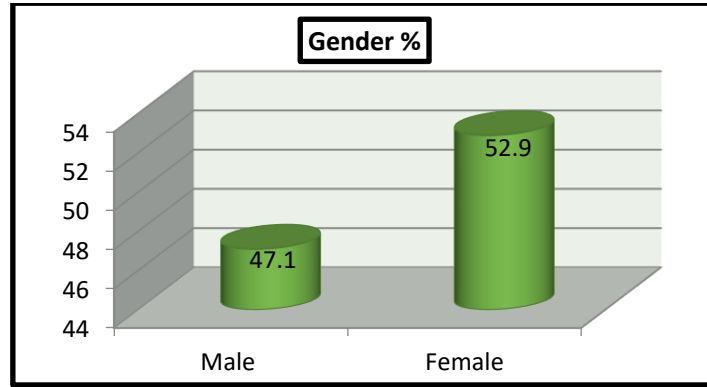
The article discusses the use of the Statistical Package for the Social Sciences (SPSS), a was used to simplify data analysis, a Likert scale was employed, assigning numerical values to response options: (1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Strongly Agree. This numerical representation aids in the statistical evaluation of respondents' perceptions and opinions.

## Result

From Table No (1) and Figure 1, showed that the number of male individuals was 16 people, while the number of female individuals was 18 people. Thus, males represent 47.1% of the sample, while females represent 52.9% of the sample.

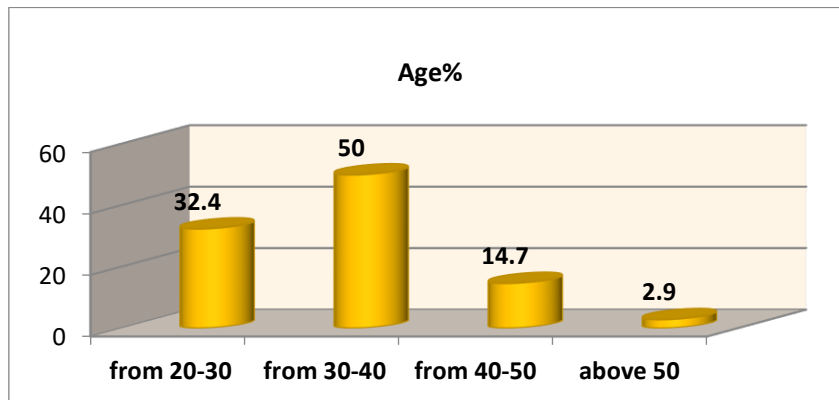
**Table 1:** Classification of the study sample according to Gender.

| Gender | Frequency | Percentage |
|--------|-----------|------------|
| Male   | 16        | 47.1       |
| Female | 18        | 52.9       |
| Total  | 34        | 100.0      |



**Figure 1:** Classification of the study sample according to Gender.

The study sample was categorized into five age groups. According to the statistical analysis presented in Chart No. (1), 32.4% of participants were aged between 25 and 30 years. Additionally, 50% of the respondents fell within the 30 to 40-year age range. Furthermore, 14.7% of individuals were aged between 40 and 50 years, while only 2.9% were over 50 years old. This breakdown provides insight into the age distribution of the study's participants.



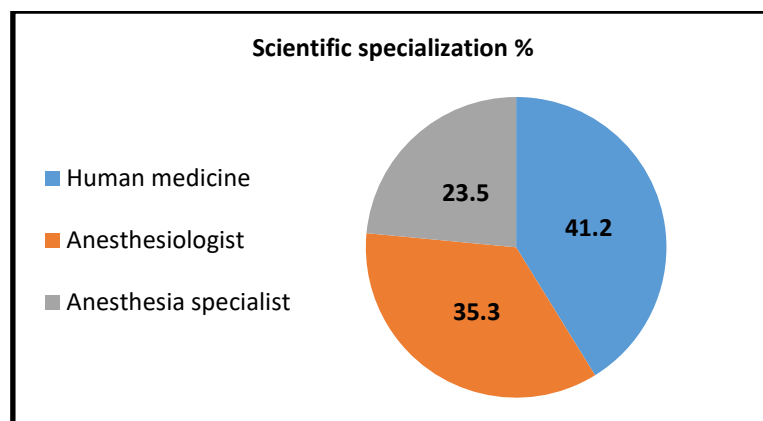
**Figure 2:** Classification of the study sample according to age.

Regarding the educational qualifications of the study sample, we note from the table below that, according to the statistical analysis, 55.9% of people hold a bachelor's degree. While the statistical percentage indicates that 32.4% of people hold a master's degree. Moreover, it is found that 4% of people hold a Ph.D.

**Table 2:** The educational qualifications of the study sample.

| Educational qualification | Frequency | Percentage |
|---------------------------|-----------|------------|
| Bachelor's                | 19        | 55.9       |
| Master's                  | 11        | 32.4       |
| Ph.D                      | 4         | 11.8       |
| Total                     | 34        | 100.0      |

Through statistical analysis of the scientific specialization of the study sample members, it is clear that 41.2% of them specialize in human medicine. While the statistical percentage indicates that 12% of people have an anesthesiologist in their scientific specialty. Moreover, it turns out that 23.5% of people are specialized in anesthesia, as shown in Chart No. (3).



**Figure 3:** The scientific specialization of the study sample members

**Table 3:** The practical experience of the individuals in the study sample.

| Experience         | Frequency | Percentage |
|--------------------|-----------|------------|
| Newcomer           | 6         | 17.6       |
| Less than 5 years  | 7         | 20.6       |
| From 5-10 years    | 13        | 38.2       |
| From 10-20 years   | 6         | 17.6       |
| More than 20 years | 2         | 5.9        |
| The total          | 34        | 100.0      |

We note from the above that 17.6% of the sample members were newcomers, and 20.6% have less than 5 years of experience. While the statistical percentage indicates that 38.2% of the sample members have experience ranging between 5 and 10 years. Moreover, it turns out that 17.6% of the sample members have experience ranging between 10 and 20 years. While statistical data indicate that 5.9% of the sample members have more than 20 years of experience

**Table 4:** The correlation between peripheral anesthesia, its complications, and its effect on the patient compared to general anesthesia.

|  |                | Peripheral anesthesia and side effects | Peripheral anesthesia and its risks | Peripheral anesthesia and safety |
|--|----------------|--|-------------------------------------|----------------------------------|
| Peripheral anesthesia and side effects | P. correlation | 1                                      | .421**                              | .045                             |
|  | Sig. level     | -                                      | .007                                | .400                             |
|  | N              | 34                                     | 34                                  | 34                               |
| Peripheral anesthesia and its risks    | P. correlation | .421**                                 | 1                                   | .112                             |
|  | Sig. level     | .007                                   | -                                   | .268                             |
|  | N              | 34                                     | 34                                  | 34                               |
| Peripheral anesthesia and safety       | P. correlation | .045                                   | .112                                | 1                                |
|  | Sig. level     | .400                                   | .268                                | -                                |
|  | N              | 34                                     | 34                                  | 34                               |

The analysis presented in Table No. (4) reveals several relationships regarding peripheral anesthesia and its perceived effects. A strong positive correlation (0.42) with a significance level of 0.007 exists between the belief that peripheral anesthesia does not cause postoperative side effects when using ultrasound and the notion that peripheral anesthesia entails any risks to the patient. This suggests that those who believe peripheral anesthesia is safe also recognize potential risks. A very weak positive relationship (0.045) was found between the belief that peripheral anesthesia causes side effects after surgery and the idea that it is safer than general anesthesia, with a significance level of 0.40. There is also a weak positive correlation (0.112,  $p = 0.26$ ) between the belief that peripheral anesthesia presents risks to patients, and the perception that it is safer than general anesthesia. Regarding contraindications, a weak negative relationship ( $-0.136$ ,  $p = 0.43$ ) was noted between the advantages of peripheral anesthesia—specifically its ability to mitigate risks in elderly patients with heart and respiratory issues—and the presence of severe contraindications such as brain infections or significant

blood loss. A very weak positive correlation (0.095,  $p = 0.58$ ) exists between the advantages of peripheral anesthesia and the impact of smoking and caffeine on anesthesia responsiveness. A weak positive relationship (0.165,  $p = 0.34$ ) was observed between contraindications for peripheral anesthesia and the effects of smoking and caffeine. There is also a weak positive relationship (0.21,  $p = 0.115$ ) between how anesthesia affects patients with musculoskeletal diseases and the risk of anesthetic allergies leading to death. Conversely, a very weak negative relationship (-0.061,  $p = 0.36$ ) was found between the impact of anesthesia on musculoskeletal patients and terminal anesthesia's effect on patients with chest allergies, like asthma. Additionally, a weak positive correlation (0.174,  $p = 0.16$ ) exists between anesthetic allergies causing death and the impact of peripheral anesthesia on asthma patients. Lastly, a weak positive correlation (0.095,  $p = 0.58$ ) was observed between the suitability of peripheral anesthesia for all age groups and the notion that patients may feel pain after the procedure.

### **Discussion**

The findings illustrate the perceptions of respondents regarding various aspects of peripheral anesthesia, particularly concerning its safety, contraindications, and effects on patients. The most significant concern highlighted was the presence of tumors, infections in the brain, and substantial blood loss, which are contraindications for peripheral anesthesia, receiving a mean score of 2.26 (SD = 0.89). This aligns with established literature, which emphasizes that certain medical conditions can complicate anesthesia management (Grewal et al., 2017). The belief that peripheral anesthesia poses risks to patients ranked second, with a mean of 2.17 (SD = 0.83). This suggests a prevailing concern that, despite its advantages, peripheral anesthesia may not be without risks, especially in vulnerable populations (Schäfer et al., 2019). The importance of monitoring vital signs was emphasized, with a mean score of 1.97 (SD = 1.11), suggesting a consensus on the necessity of continuous monitoring during procedures. This is consistent with recommendations in the literature regarding patient safety (Auroy et al., 2006). Participants expressed less concern about peripheral anesthesia's impact on patients with asthma or musculoskeletal diseases, evidenced by mean values of 1.91 and 1.82, respectively, indicating a perception that these conditions might not significantly affect anesthesia outcomes (Crawford et al., 2018). The perception that patients might experience pain after receiving peripheral anesthesia using ultrasound had a mean score of 2.22 (SD = 0.82), suggesting recognition of potential postoperative discomfort, which aligns with existing research indicating variability in patient pain experiences post-anesthesia (Kain et al., 2004). A notable correlation was observed between the belief that peripheral anesthesia does not cause postoperative side effects and the perception of risks to patients (correlation coefficient = 0.42,  $p = 0.007$ ). This indicates that respondents who perceived fewer risks also believed peripheral anesthesia to be safer. Weak correlations were noted between various items, such as between the perceived safety of peripheral anesthesia and the presence of medical contraindications, showcasing the complex relationship between different factors influencing anesthesia decisions (Harris et al., 2020).

### **Conclusion**

Overall, the study reveals a nuanced understanding among respondents regarding peripheral anesthesia. While there are recognized contraindications and risks, many respondents also acknowledge its benefits and the importance of monitoring during procedures. The interrelationships between various perceptions underscore the need for comprehensive education and training in anesthesia practices, especially concerning patient safety and risk management.

### **Recommendations**

The study recommends the following recommendations:

1. Paying attention to peripheral anesthesia because it helps reduce general anesthesia and pain-relieving medications and reduce their complications to make the most of peripheral or regional anesthesia.
2. Moving toward peripheral anesthesia because it is expected to spread in the future and reduce the use of general or spinal anesthesia.
3. In the case of peripheral anesthesia, the anesthesia consultant installs a fine catheter around the sensory nerve and leaves it for 2 to 3 days to inject the anesthetic medication to relieve pain during and after the surgical operation, to eliminate or reduce the intravenous pain-relieving medications and reduce their complications.

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