

Anesthesia methods used by anesthetic specialists for circumcision cases

National survey study for Turkey

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ABSTRACT

الأهداف: دراسة اختيار طبيب التخدير لتقنيات التخدير والأدوية في الختان وتحديد الفحص قبل الجراحة وتقنيات الرصد أثناء العملية وطرق التسكين بعد العملية الجراحية والمضاعفات الشائعة بين أطباء التخدير العاملين في تركيا.

الطريقة: أجريت هذه الدراسة المستعرضة في مستشفى جامعة بولنت أجاويد، زونجولداك، تركيا، بين شهري مايو ويوليو 2012. وقد تم الحصول على بيانات المسح عبر نماذج المسح من خلال البيانات الإلكترونية عبر شبكة الإنترنت. ويتكون الاستبيان من 20 سؤالاً. وشملت هذه الأسئلة البيانات الديموغرافية وطرق التخدير للختان وطرق التسكين بعد العملية الجراحية وطرق الرصد.

النتائج: تم الحصول على البيانات من 206 طبيب تخدير وافقوا على المشاركة في الاستطلاع. أجري الختان في أغلب الأحيان في الفئة العمرية من 3-6 سنوات. وقد وجد أن 47% من الفحوصات المخبرية قبل الجراحة الروتينية كانت بارامترات التخثر لاختبارات تعداد الدم الكاملة. وكان القناع الجراحي الأسلوب الأكثر شيوعاً للتخدير وكان تردد التخدير الناحي 37.4% وكان الاحصار العجزي أكثر تفضيلاً. كان كلا من بوبيفيكين كمخدر موضعي في التخدير الناحي وميدازولام والكيثامين الأكثر تفضيلاً في التخدير المقرون بالتهديئة. غالباً ما يستخدم أطباء التخدير الموجات فوق الصوتية أثناء التخدير الناحي (31.6%).

الخلاصة: يمكن تحسين بروتوكولات التخدير على الماشي والتي يُحتاج إليها في الختان بتوصيات دولية ويمكن اعتمادها كبنية ثقافية اجتماعية في المجتمعات وينبغي اعتبار هذه الدراسة دراسة أولية لجذب الانتباه على تقنيات التخدير في الختان.

Objectives: To examine the anesthesiologist's choice for anesthesia techniques and drugs in circumcision and determine the preoperative examination, intraoperative monitoring techniques, postoperative analgesia methods, and common complications among anesthesiologists working in Turkey.

Methods: This cross-sectional study was conducted at Bulent Ecevit University Hospital, Zonguldak, Turkey, between May and July 2012. Survey data were

obtained via survey forms through electronic data over the web. The questionnaire consists of 20 questions. These questions included demographic data, methods of anesthesia for circumcision, postoperative analgesia methods, and monitoring methods.

Results: The data were obtained from 206 anesthesiologists who agreed to participate in the survey. Circumcision was performed most frequently in the age group of 3-6 years old. It was found that 47% of routine preoperative laboratory tests were coagulation parameters and complete blood count tests. The most common method of anesthesia was laryngeal mask. The frequency of administration of regional anesthesia was 37.4%, and caudal block was more preferable. Bupivacaine as a local anesthetic in regional anesthesia and midazolam and ketamine were the most preferred agents in sedoanalgesia. During regional anesthesia, ultrasound was most often used by anesthesiologists (31.6%).

Conclusion: Ambulatory anesthesia protocols, which are also needed in circumcision, can be improved with international recommendation, and these protocols could be conformed as sociocultural structure in societies. This study should be regarded as a preliminary study to attract attention on anesthesia techniques in circumcision.

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Male circumcision is the surgical removal of the foreskin (prepuce) of the human penis. It is a very common surgical procedure that has been performed traditionally for many years.¹ Children are ideal patients for outpatient anesthesia and surgery. Success is mainly dependent on good organization, including careful selection of the patient, professional and skilled anesthetic care, and the proper knowledge for avoiding postoperative problems.² The number of outpatient operations increase in light of a variety of indications. The most common outpatient surgeries for children are minor surgeries, such as adenoidectomy and circumcision.³ These types of surgeries in children are carried out with regional anesthesia, sedation, or general anesthesia. The anesthetic method for circumcision operations varies according to the patient's situation, occupational skills, and attitude of the physician.⁴ Some studies show different clinical applications related to outpatient anesthesia.^{5,6} Although publications related to circumcision training and applications by surgeons were found from Turkey and throughout the world, we did not encounter any publication investigating the attitude and behavior of anesthetic specialists in our country to circumcision applications. The current study is the first to research attitudes and behaviors among anesthesiologists in Turkey toward anesthesia management of circumcision cases. This study aims to elicit the variety of approaches used in actual practice to anesthetic circumcision surgery.

Methods. After receiving permission from Bülent Ecevit University Research Ethics Committee in May 2012, this cross-sectional study was conducted in Bülent Ecevit University Hospital, Zonguldak, Turkey, between May and July 2012. The created survey questions were read by 15 individuals not participating in the research for clarity and preliminary study.

Data collection method. Survey data were obtained using a web-based electronic data form. Anesthesiologists working in Turkey were included in the study. Participation was voluntary, and therefore, consent was not obtained. Those who did not respond between the dates were not included in the study, and this was the only reason for exclusion from the study. The survey was sent to the known e-mail addresses of 700 anesthetic specialists, a total of 3 times at 10-day intervals. Those who had participated were reminded

not to participate again. The answered surveys were checked for repeat participation.

Survey form. The survey form comprised 20 questions. Section A included 5 questions on participants' demographic information; Section B included 13 questions on circumcision; Section C included one question on postoperative analgesia; and Section D included one question on routine monitoring methods used during circumcision operations. As it was stated that participants could give more than one answer to the questions, different combinations of survey results were obtained. These different and multi-variable answers, which were only chosen by some of the 206 anesthetic specialists, were evaluated within the group "other chosen methods." Similarly, some questions were left semi open-ended, and participants were presented with the option of choosing "other" without any request for an explanation.

Statistical analysis. Statistical evaluation was completed using the Statistical Package For Social Sciences program version 18 (SPSS Inc., Chicago, IL, USA). Descriptive statistics are given as number and percentage. Differences between the groups and correlations between variables were investigated with the chi-square test. Results were assessed at a 95% confidence interval, and $p < 0.05$ was accepted as statistically significant.

Results. The survey was sent by electronic mail and 206 anesthetic specialists responded to the survey and were included in the study. Demographic data of anesthetic specialists participating in the study are shown in (Table 1). When the organizations for which the survey participants currently worked were reviewed, 49.5% (n=102) were employed in university hospitals, 24.3% (n=50) in state hospitals, 16% (n=33) in education and research hospitals, and 10.2% (n=21) in private hospitals. When the branch performing circumcision was examined, generally more than one branch performed circumcision, and most were performed by pediatric surgery and urology (21.8%, n=45), 10.2% by pediatric surgery (n=21), 7.3% by urology (n=15),

Table 1 - Demographic data of anesthesia experts (n=206).

Participants	n	%
Female/Male	90/116	43.7/56.3
Below 30	4	1.9
31-40 years	98	47.6
41-50 years	90	43.7
51-60 years	8	3.9
61 years and above	6	2.9

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and 1.0% by general surgery departments (n=2). Additionally, the operation was performed in pediatric urology and plastic surgery departments. Concerning preoperative laboratory tests, 41.7% (n=86) requested complete blood count and coagulation, 19.9% (n=41) requested complete blood count, and 9.2% (n=19) requested coagulation, in addition to hepatitis markers and other biochemical tests. The anesthetic method for circumcision was identified as 17% general anesthesia (laryngeal mask, n=20, face mask, n=15), 8.3% general anesthesia and regional anesthesia (laryngeal mask and caudal block, n=17) (Table 2). In addition to general

Table 2 - Frequency of anesthetic methods administered for circumcision operations (n=206).

Anesthesia methods	n	%
Laryngeal mask	20	9.7
Laryngeal mask+caudal block	17	8.3
Face mask	15	7.3
Face mask+sedoanalgesia	12	5.8
Laryngeal mask+face mask	9	4.4
Laryngeal mask+dorsal penile nerve block	8	3.9
Face mask+local infiltration anesthesia+DPNB	7	3.4
Sedoanalgesia	7	3.4
Sedoanalgesia+DPNB	6	2.9
Face mask+caudal block	6	2.9
Face mask+sedoanalgesia+local infiltration anesthesia	6	2.9
Laryngeal mask+sedoanalgesia	5	2.4
Laryngeal mask+face mask+caudal block	5	2.4
Laryngeal mask+face mask+sedoanalgesia	5	2.4
Laryngeal mask+sedoanalgesia+DPNB	4	1.9
Face mask+local infiltration anesthesia	4	1.9
Face mask+sedoanalgesia+DPNB	4	1.9
Face mask+sedoanalgesia+DPNB+caudal block	4	1.9
Face mask+sedoanalgesia+local infiltration anesthesia	3	1.5
Sedoanalgesia+local infiltration anesthesia	3	1.5
Face mask+DPNB	3	1.5
Face mask+DPNB+caudal block	3	1.5
Face mask+Sedoanalgesia+DPNB+local infiltration anesthesia	3	1.5
Face mask+sedoanalgesia+local infiltration anesthesia+caudal block	2	1.0
Sedoanalgesia+DPNB+local infiltration anesthesia	2	1.0
Sedoanalgesia+caudal block	2	1.0
Laryngeal mask+face mask+sedoanalgesia+caudal block	2	1.0
Laryngeal mask+face mask+DPNB	2	1.0
Laryngeal mask+sedoanalgesia+caudal block	2	1.0
Laryngeal mask+local infiltration anesthesia	2	1.0
Caudal block	2	1.0
Endotracheal intubation+face mask	2	1.0
Laryngeal mask+sedoanalgesia+caudal block+DPNB	2	1.0
*Other method(s) chosen	27	13.1

DPNB - dorsal penil nerve block, *Different combinations of laryngeal mask, face mask, local infiltration anesthesia, dorsal penile nerve block, caudal block, sedoanalgesia

anesthesia and sedoanalgesia, regional anesthesia methods were used 37.4% of the time, and 6.8% did not use it at all. Seventy-eight (37.9%) used caudal and 56 (27.2%) dorsal penile nerve block (Table 3). When

Table 3 - Frequency of regional anesthesia in addition to general anesthesia and sedoanalgesia (n=206).

Regional anesthesia methods	n	%
Caudal block	78	37.9
DPNB	56	27.2
Local infiltration anesthesia	35	17.0
DPNB+caudal block	10	4.9
DPNB+local infiltration anesthesia	6	2.9
I do not use additional regional anesthesia methods	4	1.9
DPNB+local infiltration anesthesia+caudal block	3	1.5
Local infiltration anesthesia+caudal block	2	1.0
*Other	12	5.8

DPNB - dorsal penil nerve block, *Presented as an alternative answer, different to the options, with no explanation requested from participants.

Table 4 - Frequency of agents for sedoanalgesia administration (n=206).

Sedoanalgesic agent(s)	n	%
Midazolam+Ketamine	24	11.7
Midazolam+Ketamine+Fentanyl	22	10.7
Propofol+Midazolam+Ketamine+Fentanyl	22	10.7
Propofol+Midazolam+Ketamine	18	8.8
Propofol+Midazolam+Fentanyl	14	6.8
Propofol+Midazolam	14	6.8
Midazolam	8	3.9
Propofol+Fentanyl	7	3.4
Propofol+Midazolam+Ketamine+Remifentanyl+Fentanyl	6	2.9
Propofol+Alfentanil	5	2.4
Ketamine	4	1.9
Propofol+Ketamine	4	1.9
Midazolam+Fentanyl	3	1.5
Propofol	3	1.5
Propofol+Ketamine+Fentanyl	3	1.5
Propofol+Midazolam+Ketamine+Pentotal	3	1.5
Propofol+Midazolam+Ketamine+Remifentanyl	3	1.5
Fentanyl	2	1.0
Propofol+Remifentanyl	2	1.0
Propofol+Midazolam+Remifentanyl	2	1.0
Propofol+Midazolam+Ketamine+Remifentanyl+Fentanyl+Pentotal+Alfentanil	2	1.0
Propofol+Midazolam+Ketamine+Alfentanil	2	1.0
Propofol+Midazolam+Remifentanyl+Fentanyl	2	1.0
Propofol+Midazolam+Fentanyl+Pentotal	2	1.0
Propofol+Midazolam+Alfentanil	2	1.0
Propofol+Ketamine+Pentotal	2	1.0
Midazolam+Ketamine+Alfentanil	2	1.0
*Other	6	2.9
†Other chosen methods	16	7.7

*Presented as an alternative answer, different to the options, with no explanation requested from participants. †Different combinations of propofol, midazolam, ketamine, fentanyl, and remifentanyl

Table 5 - Methods and/or medication use for postoperative analgesia (n=206).

Analgesia methods	n	%
Paracetamol	36	17.5
Paracetamol+caudal block+DPNB	17	8.3
Paracetamol+local infiltration anesthesia	15	7.3
Paracetamol+caudal block	12	5.8
Paracetamol+ DPNB	9	4.4
Paracetamol+local infiltration anesthesia+ DPNB	9	4.4
Paracetamol+local infiltration anesthesia+Caudal block	9	4.4
Caudal block	8	3.9
Paracetamol+local infiltration anesthesia+caudal block+DPNB	8	3.9
Paracetamol+local infiltration anesthesia+NSAIDs	4	1.9
Paracetamol+Meperidine+caudal block	4	1.9
Paracetamol+ NSAIDs	4	1.9
Paracetamol+local infiltration anesthesia+NSAIDs+DPNB	3	1.5
Paracetamol+Meperidine+local infiltration anesthesia	3	1.5
Paracetamol+Meperidine+Tramadol+DPNB	3	1.5
Paracetamol+ NSAIDs+caudal block+DPNB	3	1.5
Paracetamol+Tramadol	3	1.5
Paracetamol+Tramadol+DPNB	3	1.5
Paracetamol+Tramadol+local infiltration anesthesia+caudal block+DPNB	3	1.5
Local infiltration anesthesia	2	1.0
Tramadol	2	1.0
Caudal block+DPNB	2	1.0
Local infiltration anesthesia+caudal block	2	1.0
Caudal block+Meperidine	2	1.0
Paracetamol+Meperidine+DPNB +caudal block	2	1.0
Paracetamol+Meperidine+caudal block+NSAIDs	2	1.0
Paracetamol+caudal block+Tramadol	2	1.0
Paracetamol+Tramadol+caudal block+DPNB	2	1.0
*Other	5	2.4
†Other chosen methods	27	13.1

DPNB - dorsal penil nerve block, NSAIDs - non-steroidal anti-inflammatory drugs, *Presented as an alternative answer, different to the options, with no explanation requested from participants. †Included different combinations of paracetamol, local infiltration anesthesia, non-steroidal anti-inflammatory drugs, dorsal penile nerve block, caudal block, tramadol, and meperidine.

ultrasound guidance (USG) use for regional anesthesia was questioned, 141 (68.4%) did not use it, 46 (22.3%) stated their organization did not have it, 13 (6.3%) stated the organization had it but they did not need to use it, one (0.5%) used it, and 5 (2.4%) selected the "other" answer. For circumcision operations 93.7% of dorsal penile block was administered by surgeons and 6.3% by anesthesiologists. For circumcision operations, the most common local anesthetics used for caudal block were 81 (39.3%) bupivacaine, 30 (4.6%) bupivacaine and levobupivacaine, and 23 (11.2%) levobupivacaine. For newborn circumcision operations, anesthetic

Table 6 - Frequency of monitoring methods for circumcision cases (n=198).

Monitoring methods	n	%
Pulse oximeter+EKG+blood pressure+heart rate+ETCO ₂	42	20.4
Pulse oximeter+EKG+heart rate+ETCO ₂	35	17.0
Pulse oximeter+EKG+heart rate	27	13.1
Pulse oximeter+EKG	24	11.7
Pulse oximeter+EKG+ETCO ₂	14	6.8
Pulse oximeter+EKG+blood pressure	9	4.4
Pulse oximeter+EKG+blood pressure+heart rate	9	4.4
Pulse oximeter+heart rate	6	2.9
Pulse oximeter+EKG+ETCO ₂ +temperature	6	2.9
Pulse oximeter+EKG+ETCO ₂ +blood pressure	5	2.4
Pulse oximeter	5	2.4
Pulse oximeter+heart rate+ETCO ₂	4	1.9
Pulse oximeter+EKG+blood pressure+heart rate	3	1.5
Pulse oximeter+EKG+blood pressure+ETCO ₂ +temperature	1	0.5
Pulse oximeter+EKG+blood pressure+temperature	1	0.5
Pulse oximeter+EKG+blood pressure+heart rate+temperature	1	0.5
Pulse oximeter+ETCO ₂	1	0.5
Pulse oximeter+blood pressure+heart rate	1	0.5
Pulse oximeter+heart rate+ETCO ₂ +temperature	1	0.5
*Other	3	1.5

EKG - electrocardiogram, ETCO₂ - end-tidal carbon dioxide, *Presented as an alternative answer, different to the options, with no explanation requested from participants.

methods commonly used were general anesthesia (17% laryngeal mask, 14.1% face mask, and 7.3% endotracheal intubation). Sedoanalgesia administration for circumcision operations most frequently used midazolam and ketamine (11.7%) (Table 4). The most common complications after circumcision were hemorrhage (22.3%), bronchospasm or laryngospasm (17%), and severe pain (7.8%). Paracetamol was used most commonly as a drug for analgesia after circumcision (Table 5). When monitoring methods for circumcision operations were assessed, there was a high rate of use of the combination of pulse oximeter and electrocardiography plus blood pressure plus heart rate plus end tidal carbon dioxide (20.4%) (Table 6).

Discussion. Anesthesiologists frequently choose laryngeal mask and the regional anesthesia method of caudal block for circumcision operations, and 31.6% use USG for the block. The most frequently observed complication appears to be hemorrhage. Paracetamol frequently is used for postoperative analgesia after circumcision.

In a survey study to determine the level of knowledge of practitioner clinicians in Turkey on circumcision by Cankorkmaz et al⁷, 200 clinicians were reached by post

and 178 people (72%) responded to the survey. A postal survey to assess clinical applications by anesthesiologists for outpatient pediatric surgery in England had a 74% and 63% response rate.⁶ This study reached 580 anesthesiologists by electronic mail and received a response from 206 (35.5%). We believe the reason for the low participation rate for survey studies in the electronic environment in Turkey is that these types of studies are relatively new and infrequently performed.

A study by Yıldız et al⁸ researching the attitudes and behaviors of anesthetic specialists to anesthetic administration outside the operating room stated that the highest participation was from university hospitals (31.7%). In the current study, the reason for the highest response rate coming from university hospitals (49.5%) may be linked to the active role played by universities in education and research.

A survey study by Şahin et al⁹ found that of 1,235 children's circumcisions were performed by traditional circumcisers for 13.3% and by pediatric surgeons, and urologists for the remainder. In a study by Yakıncı et al¹⁰ researching the occupational distribution of those performing circumcisions, 66% were qualified health officers, 13.2% were nonmedical personnel, 8.8% were urologists, 6.2% were practitioners, 2.9% were general surgeons, and 2.8% were pediatric surgeons. In the current study, in general, more than one branch performed circumcision, and the highest rate was 21.8% pediatric surgery plus urology, 10.2% pediatric surgery, 7.3% urology, and 1.0% general surgery departments.

If no problem is identified in history or physical examination, the view that routine laboratory tests are not required, especially for minor surgical interventions, is becoming more common.^{11,12} Johnson et al¹³ reported that routine preoperative tests (complete blood count, urea, electrolytes, and glucose) affected anesthesia planning for only 0.2% of patients and that reorganizing tests according to requirements could reduce hospital costs by £50,000 yearly. In the current study, 41.7% requested complete blood count plus coagulation, 19.9% requested complete blood count, and 9.2% requested coagulation. We think that preoperative history and physical examination can avoid unnecessary expenses and ensure labor savings.

Debates on the age for circumcision still continue.¹⁴ In some African tribes, circumcision is performed at birth, and in Jewish tradition, it is performed in the first days after birth.¹⁵ To prevent negative issues like castration phobia, it is recommended that circumcision not be performed between the ages of 3 and 6.¹⁶

Aydur et al¹⁷ observed that 11% of Turkish children were circumcised in the age interval 0-2 years old, 27.1% from 3-5 years old, and 61.7% from 6-12 years old. Cüceloğlu et al¹⁸ determined that circumcision after the age of 7 carried more risk in terms of early ejaculation than before the age of 7, so circumcision should be performed under the age of 7. They stated that, as the 3-7 year interval appeared to be the "phallic period," the ideal age may be 0-3 years old. In the current study, most circumcision operations were performed from 3-6 years old (31.6%), with the least completed in the newborn period (1%). We believe parents need to be informed regarding the phallic period and clinicians need to expend more energy so that circumcision is performed during the appropriate age interval.

Supraglottic airway devices are commonly used for pediatric anesthesia.^{6,19} The current study found that the laryngeal mask was the most common anesthetic method used for circumcision operations.

Circumcision, which is performed on an outpatient basis, is a commonly performed operation in children. Various methods are being used for the postoperative pain of this operation, such as topical analgesia, caudal block, dorsal penile nerve block (DPNB), and systemic nonsteroidal anti-inflammatory drugs (NSAIDs), or opioids.²⁰⁻²⁶ The current study found that 37.9% administered caudal block, 27.2% administered dorsal block, and 17.5% used paracetamol to reduce postoperative pain.

In recent years, the use of ultrasound has become popular in the performance of regional anesthesia. An increasing number of anesthesiologists use these techniques in their daily clinical practice.²⁷ Several studies have shown the benefit of ultrasound over "blind" or "landmark" techniques.^{21,28,29} However, others showed no difference between the 2 techniques for the DPNB.²⁹ In the current study, when the frequency of USG use was examined, 68.4% of anesthesiologists did not use USG, while 22.3% stated that their organization did not have a USG device.

Comparing bupivacaine and levobupivacaine for caudal block administration, a study found that due to cardiovascular and central nervous system side effects of high doses of bupivacaine, levobupivacaine was more reliable.^{20,30} Locatelli et al²² reported that for caudal block administration bupivacaine provided a longer duration of analgesic effect and higher motor block incidence than ropivacaine and levobupivacaine, while 2 cases developed sinus bradycardia. As a result, they considered that levobupivacaine was more reliable for pediatric surgery. In the current study, bupivacaine

was observed to be the most common choice for block administration. We believe the reason for levobupivacaine being chosen less often may be due to this medication not being available in Turkey.

Studies have stated that dormicum, propofol, and ketamine are commonly used for sedoanalgesia of children undergoing minor urologic surgery.^{31,32} In the current study, for sedoanalgesia administration, the combination of midazolam plus ketamine (11.7%) was chosen most often, and we believe this is due to providing better hemodynamic stability and surgical conditions.

Circumcision is a common surgical procedure, but few epidemiological studies have reported a frequency of adverse events, most commonly bleeding and infection. Important risk factors include the patient's age, the employed surgical technique, as well as the experience of the person performing the procedure.³³⁻³⁵ In developed countries where circumcisions are performed by professionals, the rate of development of complications is 5%; in developing countries where circumcisions are performed by health technicians is 10%; and for circumcisions performed by a traditional circumciser, the rate reaches 85%.³⁴ There are studies in Turkey indicating that there are more complications after circumcision by circumcisionists compared with specialist clinicians.^{10,35} Respiratory infections have been encountered by patients without preoperative evaluation by anesthesiologists before circumcision, with laryngospasm incidence rates increasing 2-7 times with mask anesthesia.³⁶ In the current study, complications after circumcision included hemorrhage and bronchospasm or laryngospasm.

The main limitation of this study is that this work is based on a web questionnaire, and although the total number of anesthesia specialists in Turkey is estimated to be around 4,000 people, approximately only 5% of the population answered the survey. Thus, these results may not reflect the attitude of all anesthesiologists in Turkey.

In conclusion, we observed that there are different applications used by clinicians for anesthesia of circumcision cases in Turkey. This survey, when the participation is noted, is an insufficient study of the anesthetic methods administered to circumcision cases, but is accepted as a preliminary study to draw attention to the topic. We believe that we need to develop standard anesthesia protocols within the frame of international recommendations for circumcision operations, the most commonly performed outpatient surgical procedure.

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