A Comparative Study of Three Different Dosages of Hyperbaric 5% Articaine (Carticaine) in Spinal Anesthesia

SPINAL ANESTEZİDE ÜÇ AYRI DOZDA %5'LİK ARTICAINE (CARTICAINE)'İN ETKİLERİNİN KARŞILAŞTIRILMASI

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Summary

Spinal anesthesia (saddle block) is a good choice in perianal procedures because of prolonged postoperative analgesia. The aim of this study was to compare three different dosages of hyperbaric 5% articaine in saddle block. Fourty-five patients of ASA I and II class undergoing perianal procedures were included in the study. Patients were divided into three groups. Spinal anesthesia was performed with three different dosages of hyperbaric 5% articaine in group A, B and C as 2, 1.5 and 1 m Hi lit res respectively. Haemodynamic variables, peripheric oxygen saturation, duration of analgesia and degree of motor blockade were recorded in each group during the study.

Systolic arterial pressure significantly decreased in group A compared with group B and C ($p<0.05$). No significant difference in motor blockade in regard to grading (grade 2 or 3) was found between group A and B while grades of group A and B were significantly higher than the grade of group C separately ($p<0.01$, $p<0.01$, respectively). Duration of analgesia was the longest in group A which was significantly higher than group B and C (265±61.5, 216±24.6 and I73±22.I; $p<0.05$, $p<0.01$, respectively). Quality of analgesia was insufficient in three patients of group C.

We concluded that 1.5 mililitres of hyperbaric 5% articaine is the most appropriate dosage for saddle block because of sufficient analgesia and minimal adverse effects.

Key Words: Anesthetics local, Hyperbaric articaine, Anesthesia regional, Spinal, Anesthesia techniques, Saddle block

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Özet

Perianal cerrahi girişimlerde, postoperatif analjezi sağlaması nedeniyle spinal anestezi en iyi seçimdir. Bu çalışmada, Saddle blokta hiperbarik %5'lik artikainin üç farklı dozu karşılaştırıldı. Perianal cerrahi girişim uygulanacak, ASA I ve II'de 45 hasta çalışmaya alındı. Hastalar 3 gruba ayrıldı. A, B ve Cgruplarında; 2, 1.5 ve 1 ml volümlerde hiperbarik %5'lik artikain ile spinal anestezi yapıldı. Hemodinamik değişiklikler, periferik oksijen saturasyonu, analjezi süresi ve motor blok derecesi her grupta kaydedildi.

Grup B ve C ile karşılaştırıldığında, Grup A 'da sistolik kan basıncı belirgin olarak düşme görüldü ($p<0.05$). Motor blok derecesi, grup A ve B arasında belirgin farklılık göstermiyordu, fakat Grup A ve B'deki motor blok derecesi, Grup C'den belirgin olarak yüksek bulundu ($p<0.01$, $p<0.01$).

Sonuç olarak, Saddle blokta 1.5 ml volümde %5'lik hiperbarik artikainin, minimal yan et/cilerle birlikte yeterli analjezi sağladığını gözledik.

Anahtar Kelimeler: Lokal anestezikler, Hiperbarik artikain, Rejyonel anestezi, Spinal, Anestezi teknikleri, Saddle blok

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Due to long-lasting postoperative analgesia, the spinal anesthesia administered with local anesthetic solutions for perianal operations has to be a favorable choice. Local anesthetics as bupivacaine, tetracaine and lidocaine have been used in many studies regarding this purpose (1-4).

Articaine consisted of thiopene molecule, a different local anesthetic, is metabolized to articainic acid (5). Two to five percent of the adminis-

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tcred dosage is extracted as unchanged while 40-70% and 4-15% is eliminated as articainic acid and its glucronide form respectively (6,7). In order to determine the most optimum dosage of hyperbaric 5% articaine in perianal operations, we used three different dosages of hyperbaric articaine for saddle block in this study.

Materials and Methods

After Institutional Rewiev Board approval of the study protocol, all patients gave their consent to participate in the study. Fourty-five patients, aged 25-45 years, of A S A I and II class undergoing perianal procedures were included in the study. Patients were divided into three groups randomizely (n=15) and no premedication was given. After placement of an intravenous catheter 500 mililitres of 0.9% N a C l was infused rapidly. E C G and pulse oximetry monitoring were commenced in all patients. Additionally, arterial pressure were measured with a noninvasive device. The L3-L4 or L4-L5 interspace was punctured with a 22G spinal needle as the patient in sitting position. In group A, 2 mililitres of hyperbaric 5% articaine was given intrathecally. In group B, 1.5 mililitres of hyperbaric 5% articaine was used for spinal anesthesia. In group C, spinal anesthesia was performed with 1 mililitre of hyperbaric 5% articaine. After injection of hyperbaric 5% articaine into the subarachnoid space, the sitting position of all patients were maintained for 5 minutes to obtain saddle block.

During the study the subjects were monitorized by continious E C G, pulse oximetry and intermittant systolic arterial pressure recordings. Bromage scale was used to evaluate the degree of motor blockade (Grade 0= no motor blockade; Grade 1= inability to raise extended leg; Grade 2= inability to ilex knees; Grade 3= inability to move feet and knees) and the level of analgesia was assessed with pin prick test. The duration of sensory blockade was defined as the lapsed time from the intrathecal injection of hyperbaric articaine to the onset of pain postoperatively. Each patient was observed during surgery and postoperative course regarding the complications and adverse effects.

The results are presented as mcans±SD. Comparisons of means were performed by analysis of variance, tukey test and student t test. $p<0.05$ was accepted as statistically significant.

Table 1. Means of age, operation time and time onset of analgesia in three groups (mean±SD)

	Group A	Group B	Group C
Age (years)	33.0±8.1	33.0±8.1	32.9±7.5
Duration of operation (minutes)	30.0±7.1	28.5±9.4	29.5±8.3
Time onset of analgesia (minutes)	4.2±0.6	4.1 ±0.6	4.5±0.4

Results

We used three different dosages of 5% hyperbaric articaine intrathecally in 45 patients scheduled for perianal procedures. There were not statistically significant difference in terms of age, sex, operation time and time onset of analgesia among groups. A l l were summarized in Table 1.

Although sensory blockade with hyperbaric articaine was obtained in all groups, it was insufficient for surgical procedure in three out of twelve patients of group C. To provide good operating conditions for those patients we administered general anesthesia with mask (50% nitrous oxide/ 1% halothanc) in addition to saddle block.

As shown in Figure 1, a statistically significant hypotension at the 5th and 10th minutes in group A which was resolved by rapid intravenous infusion without using any vasopressor drug was observed. In group B and C, arterial pressure values maintained stable throught the study period. Arterial pressure was significantly higher in group C than in group A in the assessment of 120th minutes ($p<0.05$). There was no statistically significant difference in regard to heart rate between three groups

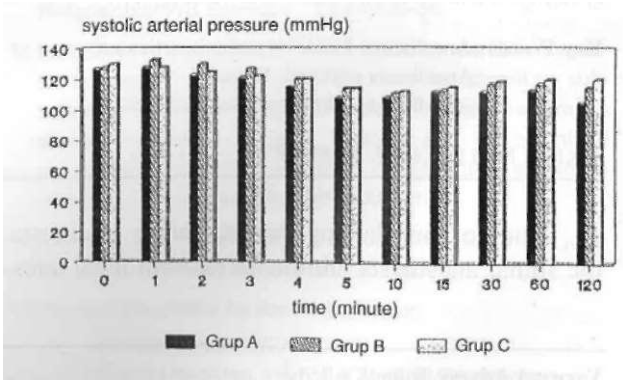

Figure 1. Systolic arterial pressure measurements in group A. **B** and C during the study (mean±SD).

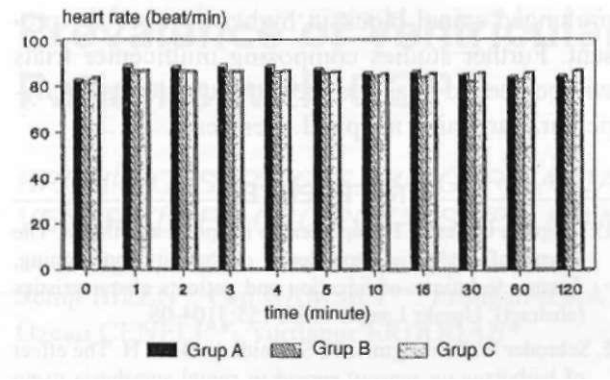

Figure 2. Heart rate changes in three groups during the study (mean±SD).

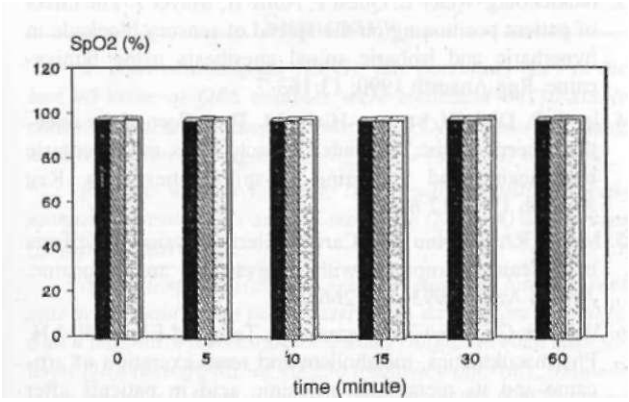

Figure 3. The variations in peripheric oxygen saturation values between three groups (mean±SD).

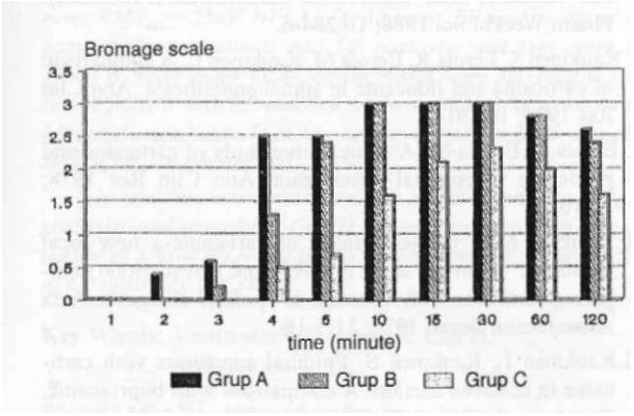

Figure 4. Degrees of motor blockade on Bromage scale in group A, B and C (mcan±SD).

and it was not significantly different at any given time in each group either (Figure 2). Peripheric oxygen saturation at 10 th minute of group A was significantly lower than group C ($p<0.05$), while there was no significant difference at all other time among the three groups and no significant difference was found at all time in each group. The variations in peripheric oxygen saturation values were illustrated in Figure 3.

Table 2. Duration of analgesia in group A, B and C during the study (mean±SD)

	Group A	Group B	Group C
Duration of analgesia (minutes)	265±61.5	216±24.6	173±22.1

Motor blockade began in the 2nd minute in group A, in the 3rd minute in group B and in the 4th minute in group C. There was no significant difference with respect to motor blockade between group A and B in the 3rd minute, while all groups were significantly different with each other in terms of the 4th minute's motor blockade ($p<0.05$). The significance between group A and B was lost in the 5th minute whereas differences between groups A and B with group C were still maintained in the 120th minute. The degree of motor blockade in each three group was demonstrated in Figure 4.

The duration of analgesia was significantly different in each group of which the most short and long time was recorded in group C and A respectively (group A, B and C; 265±61.5, 216±24.6 and 173±22.1 minutes; respectively) ($p<0.05$ between group A and B; $p<0.01$ between group A and C; $p<0.01$ between group B and C). These results were summarized in Table 2.

Discussion

The aim of this study was to determine the most optimum dosage of hyperbaric 5% articaine in saddle block. Sufficient analgesia for the operation was not obtained in three of fifteen patients receiving 1 mililitre of hyperbaric articaine intrathecally. Since a techniqual fault was not considered, insufficient dosage of hyperbaric 5% articaine might be responsible for inadequate analgesia. Analgesia was statisfactory to perform the operation in all patients whom 1.5 and 2 mililitres of hyperbaric 5% articaine were used.

A significant hypotension was observed at the 5th and 10th minutes in group A which might be caused by the high dosage of hyperbaric articaine, but hypotension was treated with fluid infusion and vasopressor agent was not needed. The arterial pressure of group C (administered 1 mililitre of hyperbaric 5% articaine) was significantly higher than group A (administered 2 mililitres of hyperbaric 5% articaine) in 120th minute. The difference of group C in 120th minute may be related to regression of sensory blockade and the onset of pain. Heart rate was been stable during the operation and postoperative period in each group.

Peripheric oxygen saturation was significantly low in group A at 10th minute that can be linked to the occurence of simultaneous hypotension. The improvement in oxygen saturation was ensured by the adniinistration of nasal oxygen.

The longest duration of analgesia was provided in group A. Since severe postoperative pain is frequently occurred in perianal operations this is an important advantage for those procedures. The duration of a motor blockade of grade 2 or 3 was long in accordance with the duration of analgesia in group A in our study. This may be a problem for the outpatient procedures. Any significant differences related to clinical effects were not found in the previous studies compared with articaine, prilocaine and lidocaine (8-10).

Kaukinen et al. found no differences in terms of Apgar scores, maternal and fetal morbidity with the administration of bupivacaine and articaine for epidural anesthesia in caesarean section (11). Although a case of acute allergic reaction with articaine usage in mandibular block was reported (12), any allergic reaction related to the administration of hyperbaric articaine did not occur in our study.

In conclusion it seems likely to think that the optimum dosage of hyperbaric 5% articaine in saddle block is to be 1.5 mililitres. The risks of insufficient analgesia in lower dosages, hypotension and prolonged spinal block in higher dosages are present. Further studies composing multicentcr trials will be needed to assess the optimum dosage of hyperbaric articaine in spinal anesthesia.

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