

Pelvic Osteotomy Under General Anaesthesia Combined with Caudal Blockade in Children

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Summary

Combined anaesthesia (Local plus General) has been used at the 1st Clinic of Orthopaedics since 1986. A trial is described involving 21 children and comparing them with a control group of 14 cases having only inhalation anaesthesia. Caudal blockade with Bupivacaine is the local anaesthesia used to decrease stress during pelvic osteotomies. The use of combined anaesthesia provides smoothness and stability with absence of side effects and the doses of anaesthetic and post-operative analgesic agents used were less than in the inhalation group.

Postoperative analgesia lasts approximately 2-4 hours longer than general anaesthesia.

Introduction

The pelvis is one of the areas in the human body that when operated on triggers stress and its consequent chain reaction. This is mediated primarily via sympathetic connection between pelvis and the suprarenal glands.⁽¹⁾

The medulla of the suprarenal gland originates phylogenetically from the sympathetic ganglion after the postganglionic neurons have lost their axons and turned to gland cells participating in stress reactions by secreting adrenaline and nor-adrenaline directly in the blood stream.

Therefore the interruption of sympathetic connection between the site of operation, the pelvis and the suprarenal gland by means of local anaesthesia has prophylactic importance in avoiding stress during and after operation.

Caudal block anaesthesia is the local method used for pelvic osteotomies at our clinic.

Material and Method

The investigated groups needing pelvic operations consisted of 21 children aged 2 - 17 years (average 11 years) and a control group of 14 children 4 - 18 years (average 14 years) see Table No. 1.

The caudal blockade was performed in a left or a right side position under general anaesthesia. Routine premedication was administered i.m. 30-45 minutes before the induction of anaesthesia. The pre-medication used was Scopolamine bromide 0.01mg per 1kg b.w. (Benarcos SPOFA) and Chlorpromazine hydrochloride 0.5 mg per 1kg b.w. Before the induction of local anaesthesia Ketamine was used in an intramuscular dose of 8-10 mg per 1 kg b.w. For local anaesthesia Bupivacaine was administered in concentration 0,3% - 0,35% according to Cvachovec⁽²⁾ in the following doses.

children under 5 years of age - age in years + 1 ml
children under 10 years of age - age in years + 2 ml
children under 15 years of age - age in years + 3 ml

After the administration of the local anaesthetic the child was placed in the supine position and an i.v. line was prepared. The operations lasted 60 -130 minutes (one lasted 180 minutes) including spica cast application.

During the operations the blood loss was minimal. Physiologic saline was administered in all cases but in two patients blood transfusion had to be given.

Results

Out of 21 cases selected for local anaesthesia successful block was obtained in 19 cases. In two cases this failed. Out of these 19 cases, 12 patients did not need any other anaesthesia but in 6 cases additional Ketamine was needed in doses of 0,5-1, 0 mg per 1 kg b.w., I.V., and in 1 case inhalation of Nitrous oxide and Oxygen had to be added.

During the operation the blood pressure decreased by 10 - 15 torr (10 - 12%) after 35 - 45 minutes.

At the same time the heart rate slowed down by 10 - 20 beats per minute (10 - 20%). Both these effects were probably due to the onset of the sympatholytic influence of local anaesthesia and

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simultaneous gradual weaning of the Ketamine - effect.

The duration of analgesia was an average of 8 hours postoperatively.

The control group was operated under inhalational anaesthesia with Nitrous oxide, Oxygen and halothane but with controlled ventilation.

During these operations there were no changes in the blood pressure. But during the pelvic osteotomy the elevation of bone grafts was accompanied by tachypnoea and tachycardia heart rate (increased by 20 - 25 beats per minute).

In this group analgesia lasted 5 hours after the operation.

The children in the first group were calmer and could be sooner contacted in the early postoperative period than those in the control group.

Discussion

The combination of Caudal block with rather heavy premedication and Ketamine has the following advantages.

1. An adequate and heavy premedication reduces global preoperative doses of anaesthetic agents.
2. Ketamine dissociative anaesthesia enables the smooth administration of the caudal blockade especially in small children.
3. The interruption of sympathetic transmission and the liberation of stressors protects the patient from cardiovascular instability.
4. Caudal blockade induces satisfactory muscle relaxation in pelvic area and lower extremities while leaving a sufficient ventilatory performance.

5. Postoperative analgesics are required 2 - 4 hours later than after inhalation anaesthesia.

6. The anaesthesia is smooth and stable.

7. After caudal blockade children recover sooner, they do not suffer from pain and soon join the social life in the ward. Bupivacaine 0,3 - 0,35% can be considered the best concentration, as lower concentrations do not guarantee adequate intraoperative analgesia and higher concentrations have shorter analgesic effect.

In two cases of failure it was impossible to penetrate the hiatus canalis sacralis probably owing to congenital abnormalities in the sacral region.

In the group with caudal blockade no side effects, e.g. blood pressure depression, retention of urine or incontinence, infection, neurologic complication or vomiting were observed.

In the control group only one boy suffered from transitory retention of urine and two girls vomited.

Cvachovec has published similar results with caudal blockade in children in urological operation.⁽²⁾

Conclusion

The advantage of the above mentioned combined anaesthesia i.e. restriction of stress, calm and painless operative and postoperative period, lower consumption of anaesthetic agents, longer analgesic postoperative interval, satisfactory muscle relaxation of lower limbs with normal function of respiratory muscles and practically no side effects support the application of this method in pelvic operations in children.

TABLE NO. 1

Group: Ketamine + caudal blockade

Operation	Number of Patients
Pemberton's acetabuloplasty with open reduction of the head of the hip joint	3
Salter's osteotomy with reduction of the joint/ evacuation of the acetabulum/	3
Salter's osteotomy in Elizabethtown modification with prolongation of lower limb by 3cm	8
Salter's osteotomy without reduction	7
Steel's tripple osteotomy of pelvis	1
Bosworth shelf operation	1
Total	21

Control group: anaesthesia with O₂ + N₂O + Halothane

Pemberton's acetabuloplasty without open reduction	3
Salter's osteotomy of pelvis without reduction	9
Steel's triple osteotomy of pelvis	1
Chiari osteotomy of pelvis with transposition of great trochanter	1
Total	<u>14</u>

References

1. **Ganong W.F.** Physiology Avicenum, Praga 1976 Page 267 - 268.
 2. **Cvachovec K.** Acta Anaesthesiologica Melitensia Volume 1 No. 4 Page 23 -25.
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