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Background

- Spinal anesthesia (SA) is increasingly being used in infants undergoing appropriate surgeries to avoid potential negative neurocognitive impact of general anesthesia (GA).
- An important limitation to SA is that it provides a relatively short duration of anesthesia, generally lasting less than 60 minutes.
- To clarify outcomes of SA for longer cases, we reviewed our experience with SA for long (≥ 60 minutes) surgical procedures.

Methods

Design: Retrospective review (2015-2017) of SA cases for surgical procedures lasting ≥ 60 minutes in children up to 3 years of age.

Procedure:

Caregivers' consent for SA after explaining both GA and SA techniques.

Application of LMX 4% lidocaine topical anesthetic cream on the intended lumbar puncture site 30-45 minutes prior to the procedure.

SA with isobaric preservative-free bupivacaine 0.5% in a dose of 1 mg/kg (up to 7 mg) \pm clonidine 1 μ g/kg and epinephrine (1,200,000 or epinephrine-wash).

Insertion of a peripheral IV catheter in the one of the lower extremities.

Gentle restraint of the arms and provision of a pacifier dipped in sucrose 24% in fussy children

Primary outcome: success of SA, defined as a successful lumbar puncture and SA initiation, without subsequent conversion to GA.

Secondary outcome: exploration of factors potentially associated with success or failure of SA for longer procedures.

Statistical analysis: comparison of patient and procedure characteristics according to SA success using unpaired t-tests for continuous data and Fisher's exact tests for categorical data.

Results

- Of the 299 SA performed during the study period, 43 cases with surgery lasting ≥ 60 minutes were identified.
- Three patients were excluded because the anesthetic technique included the insertion of a caudal epidural catheter in addition to SA.
- Data from 40 patients (all males, age 7 ± 4 months, weight 8 ± 2 kg) were included in the analysis for an average procedure duration of 71 ± 12 min (range: 60-111 min).
- Procedures included male genital, groin and multiple site surgeries in 24, 10, and 6 cases, respectively.
- Only 2 children received premedication (oral midazolam) in the preoperative period.
- All of the patients received epinephrine and all except one patient received clonidine as an additive to bupivacaine
- SA was successful in 31 cases (78%) and the cause of failure was rarely due to the duration of surgery (1/9).
- Reasons for unsuccessful SA included:
 - unsuccessful lumbar puncture (n=2)
 - insufficient motor blockade (n=3)
 - sustained coughing extrusion of intestines through the hernia defect (n=1)
 - failure to place a peripheral intravenous catheter in the leg (n=1)
 - surgeon's decision to convert to a laparoscopic procedure (n=1)
 - conversion to GA after 30 minutes (n=1).
- Only 6 patients with successful SA (19%) required mild sedation using intermittent doses of dexmedetomidine (0.2-0.7 μ g/kg) and/or fentanyl (2 μ g/kg).
- Differences in procedure duration and patient characteristics were not statistically significant between successful and failed SA (**Table 1**).
- One patient (29 months old, 13.6 kg) who received bupivacaine 0.5% (7 mg) with epinephrine 1:200,000 and clonidine 14 μ g developed a high SA which was managed by positioning and oxygen administration, without conversion to GA.
- No complications or unanticipated admissions were deemed related to SA.

Table 1. Patients and procedures characteristics versus outcome of spinal anesthesia

	Unsuccessful SA (n=9)	Successful SA (n=31)	P value
Characteristic	Mean(SD) or N(%)	Mean(SD) or N(%)	
Age (months)	6 (3)	7 (5)	0.545
Weight (kg)	7 (2)	8 (2)	0.054
Procedure duration (min)	72 (15)	70 (11)	0.710
ASA physical status			0.079
1	3 (33%)	18 (58%)	
2	2 (22%)	10 (32%)	
3	4 (44%)	3 (10%)	
Epinephrine used	3 (33%)	11 (35%)	>0.99
Epi-wash used	4 (44%)	19 (61%)	0.456

SA: spinal anesthesia, SD: standard deviation, ASA: American Society of Anesthesiologists

Discussion

SA with bupivacaine 0.5%, epinephrine and clonidine 1 μ g/kg is a highly successful technique and could be indicated as an alternative to GA for children undergoing lower abdominal and urological surgery lasting between 60 and 120 minutes.

References

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