Title : MEASUREMENT OF POSTOPERATIVE PAIN AND NARCOTIC ADMINISTRATION IN INFANTS USING A NEW CLINICAL SCORING SYSTEM.

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Introduction The necessity and safety of postoperative pain relief in infants are not well established. Many believe that small infants do not suffer significant post operative pain and fear that narcotic administration is hazardous, leading to respiratory depression. The aim of this present research was to measure the effects and impact of pain and analgesia in the immediate postoperative period in children under one year of age.

Methods We have studied a group of infants ranging from 1 to 7 months, operated on for minor surgery (hernia, phimosis...). After institutional approval and parental consent, unpremedicated infants ASA 1 were scheduled for elective surgery. Induction was performed with oxygen and halothane 2.5 % and maintained with N_2O/oxygen 50 %. Infants were randomly assigned to 2 groups : Group I (n = 10) received fentanyl in a dose of 3 µg/kg as an intravenous bolus prior to the operation ; Group II (n = 13) received a placebo. After surgery, infants were studied on entry to the recovery room (time zero) and at 30, 60, 90 and 120 minutes. In order to measure pain in infants it was necessary to develop a clinical neurologic and behavioral scoring system which is described in the table below. Using the pain score, we were able to correlate pain and narcotic analgesia with the infant's postoperative respiratory and circulatory status.

A - Postoperative pain score : the infant was observed by an investigator unaware of the anesthetic regimen and 10 criteria were used (Table). Each item was scored, 2: satisfactory, 1: mediocre, or 0: poor. A baby who was very comfortable and pain-free would have a score of 20, and a baby with severe pain would score zero. Of course we expected a wide range of postoperative pain and have arbitrarily considered infants who scored 15 to 20 as having satisfactory postoperative analgesia.

B - Respiratory Function : we measured at times zero and at 30 minute intervals for two hours 1) respiratory frequency, 2) transcutaneous pO_2, 3) transcutaneous pCO_2, and 4) oxygen saturation measured with the Nellcor Pulse Oximeter.

C - Cardiovascular Function : we measured arterial blood pressure and heart rate. Evaluation of peripheral circulation was performed by an assessment of capillary refill.

D - Temperature : we measured the infant's temperature at each experimental interval and watched for possible shivering.

Results Infants who received intraoperative fentanyl (Group I) had significantly better postoperative analgesia than infants not receiving the narcotic (Group II) (Figure). Over the entire observation period 54 % of infants in Group I had satisfactory analgesia compared to 18 % in Group II ($p < 0.05$). Chi square test.There were no significant differences in Groups I and II in $TcpO_2$, $TcpCO_2$, oxygen saturation, blood pressure, heart rate or temperature at any experimental interval. Infants in Group II had a significantly faster respiratory rate, likely due to pain but the $TcpCO_2$ was not significantly lower in this group.

Conclusion Using a new clinical postoperative pain scoring system we have demonstrated that relatively small doses of intra-operative narcotic administration reduces postoperative pain in the infant and this does not result in respiratory depression or hypoxemia.

Table : POST OPERATIVE PAIN SCORE

	0	1	2
1. Sleep during preceeding hour	none	short naps : between 5 and 10 minutes	longer naps : ≥ 10 minutes
2. Facial expression of pain	marked, constant	less marked, intermittent	calm, relaxed
3. Quality of cry	screaming, painful, high pitched	modulated, i.e. can be distracted by normal sound	no cry
4. Spontaneous motor activity	thrashing around, incessant agitation	moderate agitation	normal
5. Spontaneous excitability and responsiveness to ambient stimulation	tremulous, clonic movements, spontaneous Moro reflexes	excessive reactivity (to any stimulation)	quiet
6. Constant and excessive flexion of fingers and toes	very pronounced, marked and constant	less marked, intermittent	absent
7. Sucking	absent or disorganized sucking	intermittent (3 or 4) and stops with crying	strong, rhythmic with pacifying effect
8. Global evaluation of tone	strong hypertonicity	moderate hypertonicity	normal for the age
9. Consolability	none after 2 minutes	quiet after 1 minute of effort	calm before 1 minute
10. Sociability (eye contact**) Response to voice, smile, Real interest in face	absent	difficult to obtain	easy and prolonged

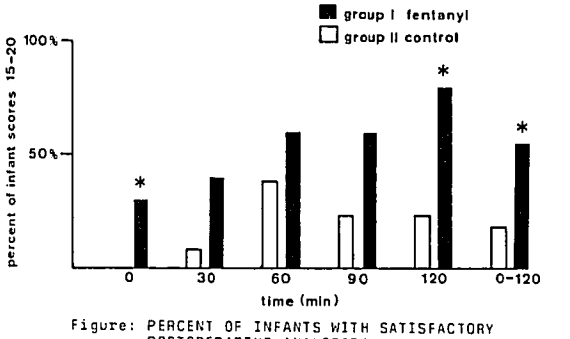

Figure: PERCENT OF INFANTS WITH SATISFACTORY POSTOPERATIVE ANALGESIA.
* $p < 0.05$ CHI SQUARE TEST