Supplementary material

Supplementary Table 1. Usage of NSAIDs alone or in combination in post-operative analgesia.

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| No. | Reference  (Country of origin) | Type of study | Sample  A. Size (N)  B. Groups  C. Characteristics  D. Additional information | Diagnostic modality | Results | Inference (Yes/No)  \*Usage of analgesics to relieve post op pain |
| 1. | Marshall *et al*. [19]  (United Kingdom) | Retrospective audit | A. N = 34  B. (i) Prescribed analgesics in accordance with the audit standards  (N = 16)  (ii) Prescribed analgesics not in accordance with the audit standards  (N = 18)  C. (i) Child provided with planned dental extractions under GA at East Surrey Hospital  (ii) Child not allergic to paracetamol and ibuprofen  D. Not applicable | WBFS by PACU nurses. | Children who received preoperative oral paracetamol received oral ibuprofen and vice versa for post-operative pain.  Postoperative pain scores were lower in the second cycle than in the first audit (47%) for all children provided with a recommended analgesic regimen. The postoperative pain scores from the third cycle were the lowest of all three cycles. | YES  Children who were prescribed analgesics in accordance with the audit standards (Analgesic regimens recommended by the Association of Paediatric Anaesthetists of Great Britain & Ireland) had lesser postoperative pain scores than the other group. |
| 2. | Kharouba *et al*. [21]  (Israel) | Prospective randomized study | A. N = 60  B. (i) Pre-emptive group received 15 mg/kg of IV paracetamol before the start of treatment  (N = 30)  Age = 4.59 ± 1.48 years  Male = 17, Female = 11  Weight = 16.41 ± 3.84 kg  Total intraoperative analgesia:  IV Paracetamol (mg) = 247.8 ± 58.5  IV Fentanyl (µg) = 32.9 ± 7.3  (ii) Preventive group received 15 mg/kg of paracetamol at the end of treatment  (N = 30)  Age = 4.52 ± 1.06 years  Male = 18, Female = 9  Weight = 17.55 ± 4.14 kg  Total intraoperative analgesia:  IV Paracetamol (mg) = 271.4 ± 67.1 IV Fentanyl (µg) = 35.4 ± 8.5  C. (i) Age = 3 to 10 years  (ii) ASA = Class I & II  (iii) Noncooperative children who underwent dental rehabilitation under general anaesthesia  D. Analgesic use in pre-emptive and preventive group:  (i) Children received fentanyl in PACU (%) = 7 (27.6), 15 (58.6)  (ii) Total IV fentanyl in PACU (µg) = 6.6 ± 2.3, 13.2 ± 4.7  (iii) Time of first fentanyl in PACU (mins) = 70.6 ± 37.3, 37.1 ± 28.6  (iv) Treated with pain relief at home (%) = 4 (13.8), 10 (38.0) | VASOF by parents after discharge. | Pain was less in the pre-emptive group at 4 h (0.0146), 8 h (0.0188), 12 h (0.0085), and 24 h (0.0001).  Children received supplemental fentanyl and paracetamol postoperatively as required. After discharge paracetamol or ibuprofen was given by parents as per analgesic need. | YES  Administration of IV paracetamol pre-emptively provide lower pain scores and a decreased percentage of children required pain relief and less amount of postoperative opioids, compared to preventive administration. |
| 3. | Gazal *et al*. [17]  (United Kingdom) | Randomised controlled trial | A. N = 21  B. Children were premedicated with:  (i) ibuprofen alone (5 mg/kg)  (N = 47)  (ii) paracetamol/ibuprofen combination (15/5 mg/kg)  (N = 51)  (iii) high dose paracetamol (20 mg/kg)  (N = 48)  (iv) control group paracetamol (15 mg/kg)  (N = 55)  Mean teeth extracted for all groups: 6 ± 3.01  C. (i) Age = 2 to 12 years  (ii) ASA = Class I or II  (iii) Elective teeth extractions of between 1 and 14 teeth  D. Pain scores 15 mins postoperatively:  In 2 to 7 years  (N = 134)  Mean scores = 7.8 (3.00)  In 8 to 12 years  (N = 67)  Mean scores = 6.1 (2.18)  *t*-test = 4.18 (*p* < 0.001) | Evaluation of distress for children was made immediately preoperatively, on recovery from anaesthesia and again after 15 mins using the CHEOPS.  One researcher trained and completely blinded from the whole process made the observations of pain and distress scores. | Significant decreases in the mean pain in both the ibuprofen alone and paracetamol/ibuprofen combination groups compared to the control group (usual-dose paracetamol) at 15 mins postoperatively.  Patients were given ibuprofen alone or in combination with paracetamol as postoperative analgesia. | YES  This study provides evidence to support the oral administration of ibuprofen alone or in combination with paracetamol for postoperative analgesia in children who are having teeth extracted under GA. |
| 4. | O’Donnell *et al*. [20]  (United Kingdom) | Prospective observational study | A. N = 210  B. 70 from each of the three hospital centres:  (i) Hospital A—preoperative oral paracetamol at a dose of 20 mg/kg 30 mins before the procedure (Male = 38, Female = 36)  (ii) Hospital B—provided 25 mg of rectal Voltarol after induction, just prior (1–2 mins) to the extractions. Children under 12 kg were provided with half this dose (Male = 38, Female = 32)  (iii) Hospital C—provided no pain relief (Male = 35, Female = 35)  C. (i) Age = 3 to 12 years  (ii) ASA = Class I or II  (iii) Undergoing primary extractions only  (iv) Good understanding in English language | VAS and WBFS self-reported. | Postoperative pain paracetamol was administered.  Children reported significantly less pain when rectal Voltarol was provided prior to the extractions, as compared to paracetamol or no analgesia.  The greatest amount of pain was reported by the group who had received no analgesia. | YES  Voltarol appears to be the better pre-emptive analgesic for dental extractions under general anaesthesia when compared with paracetamol and no analgesia. |
| 5. | El Batawi *et al*. [18]  (United Arab Emirates) | Double-blind randomised clinical trial | A. N = 180  B. (i) Group A—received diclofenac sodium  (ii) Group B—received acetaminophen  (iii) Group C—control group (no medication)  C. (i) ASA = Class I  (ii) Age = 7 to 9 years  (iii) At least one dental extraction and/or one steel crown as part of the dental rehabilitation procedures.  D. Intraoperative LA was given before extraction and pulpotomy | WBFS self-reported. | More than 93% of children in this study had post-operative pain.  Significant higher pain scores were seen in control group C when compared to group A and B children. | YES  Diclofenac sodium is more effective than acetaminophen, especially for children with multiple traumatic procedures. |
| 6 | Jensen *et al*. [22]  (Sweden) | Prospective observational study | A. N = 100  B. Intra-operative analgesics during GA  (i) Paracetamol (89%)  (ii) NSAIDs (47%)  (iii) Opioids (36%)  (iv) Combination (60%)  C. (i) Age = 3 to 12 years  (ii) Male = 51, Female = 49  (Median age 5.8 years & Range 2.8–12.8 years)  (iii) Children were scheduled on the GA because of extensive treatment needs and/or dental fear.  D. (i) Primary teeth extracted = 78 patients  (ii) Both primary and permanent teeth = 8 patients  (iii) Only permanent teeth = 14 patients  (iv) the Median number of extracted primary teeth = 5 (range 1–12) and extracted permanent teeth = 3 (range 1–4).  During GA all children received local analgesia before dental extractions | VAS by parents, FAS, and CAS by the child. Followed up to 4 days for postoperative pain. | Analgesics needed:  Day 1—60 children  Day 2—45 children  Day 3—29 children  Day 4—20 children  Paracetamol 15 mg/kg prescribed for all patients for 2 days and in case of severe pain, ibuprofen 5 mg/kg was given for 3 days. | YES  No difference among various intraoperative analgesics utilised in this study with patient’s pain scores. |

GA: general anaesthesia; ASA: American Society of Anesthesiologists; PACU: post-anesthesia care unit; NSAIDs: non-steroidal anti-inflammatory drugs; WBFS: Wong-Baker faces scale; VASOF: visual analogue scale of faces; CHEOPS: Children’s Hospital of Eastern Ontario Pain Scale; VAS: visual analogue scale; FAS: facial analogue scale; CAS: Coloured analogue scale.

Supplementary Table 2. Comparison of the usage of NSAIDs with opioid analgesics in post-operative analgesia.

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| No. | Reference  (Country of origin) | Type of study | Sample  A. Size (N)  B. Groups  C. Characteristics  D. Additional information | Diagnostic modality | Results | Inference (Yes/No)  \*Usage of analgesics to relieve post op pain |
| 1. | Littlejohn  *et al*. [23]  (United Kingdom) | Randomized double-blind study | A. N = 60  B. Following induction & before commencing surgery the patient received:  (i) Intravenous nalbuphine hydrochloride (0.3 mg/kg)  (N = 21)  Age = 6.7 years  Male = 12, Female = 9  Weight = 22.6 kg  Fasting time = 8 h  Number of teeth extracted = 4.8  (ii) one or more diclofenac suppositories (12.5 mg) to a dose of 1–2 mg/kg  (N = 19)  Age = 6.7 years  Male = 10, Female = 9  Weight = 22.3 kg  Fasting time = 8 h  Number of teeth extracted = 4.8  (iii) No analgesia (control group)  (N = 20)  Age: 6.9 years  Male = 8, Female = 12  Weight = 22.1 kg  Fasting time = 7.7 h  Number of teeth extracted = 4.9  C. (i) 3 years and above  (ii) ASA = Class I & II  (iii) extraction of carious deciduous teeth under day-case general anaesthesia  No premedication was given | An objective pain scale adapted from Hannallah and colleagues was evaluated in all patients by the same blinded observer. | Paracetamol suspension was given to five patients in the control group and three patients in the nalbuphine group compared with only one in the diclofenac group. | YES  No significant differences in analgesic effects of either intravenous nalbuphine or diclofenac suppositories compared with control |
| 2. | Alohali  *et al*. [12]  (England) | Prospective service evaluation | A. Children  (N = 143)  B. Intra-operative analgesics during GA  (i) IV fentanyl= 11  (ii) IV paracetamol = 58  (iii) IV fentanyl + paracetamol = 58  (iv) None = 16  C. (i) Age = 4–10 years (Mean age = 6.36 years)  Male = 80, Female = 63  (ii) Children who were scheduled on the GA extraction-only list.  D. (i) Mean extraction = 7 Primary teeth extracted <7 teeth = 64 (44.8%)  Primary teeth extracted >7 teeth = 79 (55.2%)  (ii) Duration of GA = 36.4 mins | Pre-operative: children self-reported pain using the FPS-R.  Post-operative after 1 week (phone interview): families scored post-operative morbidity using the Morbidity Checklist and Post Hospital Behaviour Questionnaire, child’s oral pain using FPS-R, and the family’s satisfaction using the Treatment Evaluation Inventory. | Oral analgesics = 141 (98.6%)  Paracetamol = 4 (2.8%)  Ibuprofen = 124 (86.7%)  Combined = 13 (9.1%)  None = 2 (1.4%) | YES  Use of IV paracetamol and fentanyl combination during GA reduced the immediate post-operative self-reported pain (odds ratio 0.17, log regression, *p* = 0.006). |

GA: general anaesthesia; FPS-R: faces pain scale-revised.

Supplementary Table 3. Usage of opioids in post-operative analgesia.

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| No. | Reference  (Country of origin) | Type of study | Sample  A. Size (N)  B. Groups  C. Characteristics  D. Additional information | Diagnostic modality | Results | Inference (Yes/No)  \*Usage of analgesics to relieve post op pain |
| 1. | McIntyre *et al*. [27]  (Canada) | Triple-blinded, randomized, controlled trial | A. N = 178  B. (i) Group D, Dexamethasone (0.3 mg/kg)  (N = 87)  Mean age = 55.7 (18) months  Mean weight = 18.4 (5.0) kg  Male = 51, Female = 36  Mean duration = 75 (21) mins  Median extractions (IQR) = 0 (1)  Mean crowns = 4.1 (3.2)  No. of LA = 32 (36%)  Median rescue analgesic dose (IQR) = 1 (1)  (ii) Group S normal saline (Control group)  (N = 91)  Mean age = 54.5 (19) months  Mean weight = 18.1 (5.6) kg  Male = 51, Female = 41  Mean duration = 74 (24) mins  Median extractions (IQR) = 0 (2)  Mean crowns = 3.6 (2.6)  No. of LA = 32 (35%)  Median rescue analgesic dose (IQR) = 1 (2)  C. (i) Age = 2–8 years  (ii) ASA = Class I or II  (iii) Healthy children scheduled to undergo elective outpatient dental rehabilitation requiring general anaesthesia scheduled for more than one hour.  (iv) At least one parent/guardian who spoke English  D. Preoperative acetaminophen (20 mg/kg) given for all children. Ketorolac (0.5 mg/kg) and Fentanyl (0.5 μg/kg) was given for all children before emergence. | NRS by parents 24 h after the procedure. | During the recovery period, rescue analgesia of intravenous fentanyl was given.  At the time of discharge, parents were instructed to take acetaminophen or ibuprofen in case of pain.  There was no significant difference in pain scores (NRS) at 24 h or the worst NRS experienced over the preceding 24 h. | YES  No significant difference in pain scores between the two groups.  Dexamethasone 0.3 mg/kg did not reduce pain over 24 h but had a significant reduction in post discharge vomiting in healthy children undergoing dental rehabilitation under general anaesthesia. |
| 2. | Roelofse *et al*. [25]  (New Zealand) | A double-blind randomized controlled trial | A. N = 50  B. (i) S/M group, intranasal sufentanil (20 µg) and intranasal midazolam (0.3 mg/kg)  (N = 25)  Male = 15, Female = 10  Mean age = 5.87 ± 1.33 years  Mean weight = 17.80 ± 2.72 kg  Mean number of teeth extracted = 10.68 ± 3.77  Duration of surgery = 20.64 ± 6.60  (ii) K/M group intranasal ketamine (5 mg/kg) and intranasal midazolam (0.3 mg/kg)  (N = 25)  Male = 12, Female = 13  Mean age = 5.68 ± 1.31 years  Mean weight = 17.17 ± 3.09 kg  Mean number of teeth extracted = 10.63 ± 4.26  Duration of surgery = 19.96 ± 4.95 mins  Median age = 5.87 years  No LA was used for extraction for all children.  C. (i) Age = 5–7 years  (ii) ASA = Class I  (iii) Weight = 15–20 kg  (iv) Having 6 or more teeth extracted. | Oucher facial pain scale, word graphic rating scale by the mother, the child, and the observer or researcher; and modified Hannallah objective pain scale. | Effective postoperative analgesia was provided.  The Oucher facial pain scale showed the S/M group to experience less pain than those in the K/M group, although this was not statistically significant (*p* > 0.05) | YES  The Oucher facial pain scale showed the S/M group to experience less pain than those in the K/M group, although this was not statistically significant (*p* > 0.05). |
| 3. | Roelofse *et al*. [26]  (South Africa) | Double blind randomized controlled trial | A. N = 60  B. (i) Tramadol drops (1.5 mg/kg)  (N = 31)  Male = 18, Female = 14,  Age = 5.3 ± 1.1 (3–8 years)  Weight = 17.8 ± 3.1 kg  Surgery duration = 27.9 ± 10.1 mins  Recovery time (SD) = 36.4 mins  Total number of teeth extracted = 10.7 ± 3.0 (6 to 18)  (ii) (placebo) Normal saline  (N = 29)  Male = 13, Female = 15  Age = 5.1 ± 1.2 (3 to 7 years),  Weight = 17.5 ± 3.7 kg  Surgery duration = 27.6 ± 9.3 mins  Recovery time (SD) = 29.6 mins  Total number of teeth extracted = 10.8 ± 2.9 (6 to 16)  Active recovery after 48.8 mins.  Group A was premedicated with oral midazolam (0.5 mg/kg) (maximum dose 7.5 mg) together with tramadol drops (1.5 mg/kg).  Group B children received midazolam (0.5 mg/kg) (maximum dose was 7.5 mg) and placebo (normal saline) 30 mins before induction.  C. (i) Age = 4 to 7 years  (ii) ASA Class 1 children  (iii) Undergoing dental extractions of six or more teeth under day-case general anaesthesia. | Hannallah objective pain scale scores and Oucher facial pain scale.  The research sister, mother and child were asked to assess the pain at 15, 30, 60, 90 and 120 mins post-operatively | Post-operative analgesia paracetamol 120 mg (5 mL) was given to 19.4% of the tramadol group compared with 82.8% of the placebo group (*p* < 0.05) | YES  Better analgesia was in the tramadol group at all time points, the pain score being half that of the placebo group at 60min and one third from 60 to 120 min  (*p* < 0.05). |
| 4. | Sheta *et al*. [24]  (Saudi Arabia) | Double-blinded randomized controlled trial | A. N = 72  B. (i) Group M received intranasal midazolam (0.2 mg/kg)  (N = 36)  Age = 4.2 ± 1.0 years  Male = 16, Female = 20  ASA = Class I (30) and II (6)  Surgery duration = 107.5 ± 20.8 mins  Anaesthesia duration = 126.9 ± 20.9 mins  Recovery from induction = 24.5 ± 4.6 mins  CHEOPS score median = 8 (4–12)  Rescue analgesics = 19 (52.8)  (ii) Group D received intranasal dexmedetomidine (1 µg/kg)  (N = 36)  Age = 3.9 ± 0.9 years  Male = 15, Female = 21  ASA = Class I (29) and II (7)  Surgery duration = 112.1 ± 18.8 mins  Anaesthesia duration = 127.6 ± 21.2 mins  Recovery from induction = 24.5 ± 5.1 mins  CHEOPS score median = 6 (3–9)  Rescue analgesics = 12 (33.3)  C. (i) Age = 3 to 6 years  (ii) ASA Class I & II  (iii) Complete dental rehabilitation under general anaesthesia (GA) because of their uncooperative behaviour.  D. All were given intraoperative analgesics of fentanyl (2 µg/kg). Local anaesthetic infiltration of xylocaine (20 mg/mL) and adrenaline (12.5 µg/mL) were given before extraction. For postoperative analgesia, a loading dose of rectal paracetamol (30–40 mg/kg) was administered 20 mins before the anticipated end of surgery. | CHEOPS by PACU nurse, 15 mins intervals for 60 mins | Postoperatively rectal paracetamol (30–40 mg/kg) was given 20 mins before the end of the procedure, and a repeat dose of 15 mg/kg was given every 6–8 h.  Children with ≥8 CHEOPS scores were given rescue analgesic of IV morphine (25 µg/kg), repeated if needed.  CHEOPS score median (Group M/Group D) 8 (4–12)/6 (3–9) & *p* < 0.05  Rescue analgesics = 19 (52.8%)/12 (33.3%) | YES  Postoperative pain was reduced with the use of intranasal dexmedetomidine premedication.  This was evident with lower CHEOPS scores and lesser children requiring rescue analgesics. |

LA: local anaesthesia; ASA: American Society of Anaesthesiologists; CHEOPS: Children’s Hospital of Eastern Ontario Pain Scale; IQR: interquartile range; SD: standard deviation; NRS: numerical rating scale.

Supplementary Table 4. Usage of local anaesthesia alone or in combination with paracetamol and NSAIDs in post-operative analgesia.

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| No. | Reference  (Country of origin) | Type of study | Sample  A. Size (N)  B. Groups  C. Characteristics  D. Additional information | Diagnostic modality | Results | Inference (Yes/No)  \*Usage of analgesics to relieve post op pain |
| 1. | Townsend *et al*. [30]  (United States of America) | A double-blind randomized prospective study. | A. N = 27  B. During recovery:  (i) Oral infiltration (LA) + IV Ketorolac  (N = 15)  Male = 10, Female = 5  Mean age = 4.3 ± 0.78 years  Mean weight = 18.5 ± 5.38  (ii) I.V. Ketorolac—12 (control group)  Median age = 4.3 years  Male = 9, Female = 3  Mean age = 3.8 ± 0.68 years  Mean weight = 15.34 ± 2.34 kg  C. (i) Age = 3 to 5.5 years  (ii) ASA = Class I or II  (iii) At least 2 anterior extractions/2 anterior pre veneered crowns and a minimum 4 SSC with 1 in each arch. | FLACC scale by PACU nurse, VAS by parents and WBFS self-reported at 4 to 6 h after discharge | Patients have given acetaminophen (15 mg/kg) and a bottle of children’s Tylenol was given to all patients postoperatively. | YES  No significant difference in FLACC score between the two groups. |
| 2. | McWilliams *et al*. [29],  (United Kingdom) | Randomized control study | A. N = 85  B. (i) Local anaesthesia group  (N = 45)  (4% lidocaine with 1:80,000 adrenaline & absorbable haemostatic packs)  (ii) No local anaesthesia group  (N = 40)  (absorbable hemostatic packs only)  All children were premedicated with oral paracetamol (20 mg/kg) and ibuprofen (5 mg/kg)  C. (i) Children <6 years of age  (ii) ASA = Class I  (iii) Admitted only for extraction of deciduous posterior teeth. | CHEOPS by PACU nurses | No difference in postoperative pain between 2 groups but an increase in postoperative bleeding in the group who did not have local anaesthesia administered 5/38 compared to 0/38, *p* = 0.02.  This study recorded the postop analgesics administered, no attempt was made to randomize or systematically allocate patients to different analgesic groups.  The number of patients in each different analgesic group was too low to allow statistical analysis using this variable. | The median pain score being 6 for both groups suggests that the pain was well controlled with preoperative paracetamol and NSAIDs. |
| 3. | Jürgens *et al*. [31]  (United Kingdom) | Retrospective observational study | A. N = 72  B. (i) Local analgesic group = 50,  Male = 26, Female = 24  Mean age = 7.4 years  Total number of teeth extracted = 164  Mean extraction/child = 3.3  (ii) Oral/intravenous group = 22  (Fentanyl alone or in combination with paracetamol)  Male = 5, Female = 17  Mean age = 7.8 years  Total number of teeth extracted = 112  Mean extraction/child = 5.1  C. (i) Age = 2 to 16 years  (ii) Undergoing general anaesthesia for simple extractions,  Mean age 7.5 years  Male = 31, Female = 41  D. (i) Extraction due to caries (67 patients)  (ii) Extraction due to orthodontics (5 patients)  iii) Conservative Rx and extractions (3 patients)  Laryngeal mask (16 patients), Nasal mask (53 patients), Intubated (3 patients). | Self-assessment of the 5-point pain scoring tool was used up to 24 h after the surgery. | Pain-free = 62 (86.1%)  Mild pain = 9 (12%)  Moderate pain = 1 (1.4%)  Children experiencing pain were given paracetamol or piroxicam by mouth. | YES  Local anaesthesia injections appear superior to systemic analgesia to reduce post-operative pain. |
| 4. | Sammons *et al*. [33]  (United Kingdom) | Randomized controlled trial, Single-blind | A. N = 86  B. (i) Lignocaine treatment group (42)  (ii) Control group (44)  C. (i) Age = 2 to 5 years attending for tooth extraction at the Derbyshire Children’s Hospital under the care of a single dentist.  (ii) ASA Class I  (iii) The children needed to stay for 1 hour after the procedure for observation.  (iv) Male = 47, Female = 38  Median number of teeth removed in both groups = 4 (range 1 to 13).  Median pain score in the lignocaine treatment group = 3 (IQR = 0–7.5) and control group = 3 (IQR = 0–10)  D. All children participating received a single preoperative dose of ibuprofen (10 mg/kg) and paracetamol (20 mg/kg). | Toddler-Preschooler Postoperative Pain Scale one of the two investigators, blinded to the child’s treatment. The pain was scored by the investigators at 5-, 15-, 30- and 60-mins time points in the first hour after recovery.  WBFS for the child by parents over the next 3 days to record the need for analgesics. | At 5 mins time point after recovery, the pain score in the lignocaine group was lower than the control group (*p* = 0.023). There was no difference in the 15-, 30- or 60-mins time points.  Codeine phosphate (500 μg/mg/kg per dose 4–6 hourly) 22 (51%) was used in lignocaine group and 23 (52%) in the control group.  For postoperative pain relief at home paracetamol (15 mg/kg) and ibuprofen (5 mg/kg) was advised. | YES  Intraligamental use of lignocaine for dental extraction under general anaesthesia initially causes less pain in young children after recovery, but it does not sustain over the first hour after the procedure. |
| 5. | Leong *et al*. [32]  (United Kingdom) | A double-blind randomized controlled trial | A. N = 54  B. (i) No LA (NLA) Control group  (N = 18)  Median age = 4.5 years  Median weight = 18.0 ± 3.56 kg  Median number of teeth extracted = 8  Time elapsed from the beginning of anaesthesia to recovery = 31.0 ± 8.79  (ii) Infiltration injection (IFL)—17 Median age = 4.7 years  Median weight = 18.9 ± 2.33 kg  Median number of teeth extracted = 8  Time elapsed from beginning of anaesthesia to recovery = 32.1 ± 8.10  (iii) Intraligamental injection (ITR)— 19  Median age = 4.4 years  Median weight = 18.5 ± 3.40  Median number of teeth extracted = 6  Time elapsed from the beginning of anaesthesia to recovery = 34.1 ± 10.56,  Median age = 4.5 years.  C. (i) Age = 2 to 6 years  (ii) ASA = Class I or II  (iii) Scheduled extractions of deciduous teeth under outpatient “short-case” GA were selected. | STPPPS by parents at the recovery ward (0 m), 30 mins, first night, second night and third night and supplemented with the MPDS was performed at the time of recovery in the recovery room (0 min), 15 mins and 30 mins. | Postoperative pain/discomfort and anxiety scores were not significantly different during the period of recovery.  On the 1st night, intraligamental group had significantly lower pain scores (*p* = 0.012). Upon discharge, parents/guardians were instructed to administer oral analgesics to the child on a PRN (Pro Re Nata) basis. | YES  Reduction in pain scores observed in all three groups with no significant differences.  Postoperative pain/discomfort and anxiety during recovery was not affected by perioperative injection techniques of LA. |
| 6. | Coulthard *et al*. [28]  (United Kingdom) | Randomized controlled trial | A. N = 139 patients  B. After induction of anaesthesia:  (i) Local anaesthesia  (N = 70)  (ii) Saline intraoral injection (control group)  (N = 69)  C. (i) Aged 12 years or less,  (ii) scheduled for dental extractions of 1 to 10 teeth, under general anaesthesia  (iii) Male = 73, Female = 66  Median age = 6 years  Mean weight = 22.5 ± 6.9  Mean no. of teeth extracted: 5.8 ± 2.6  Mean anesthetic time = 116 ± 30.7 min  D. All patients received 15 mg/kg acetaminophen elixir preoperatively.  Reason for dental extraction:  Caries = 86 (61.9%)  Acute dental abscess = 48 (34.5%) Orthodontic treatment = 5 (3.6%). | Five-face scale for pain intensity measurement preoperatively, on waking, at 30 mins, at 24 h postoperatively by the research nurse and child. | “Severe” pain scores—13% of LA group and 12% of control group and “very severe”—13% of LA group and 10% of control group on waking.  Administered syrup acetaminophen as required for pain relief.  LA group = 58 (82.9%)  Placebo group = 60 (86.9%) took acetaminophen elixir. | YES  Intraoperative local anaesthesia was not effective in reducing postoperative pain or distress in children  after oral surgery. |

LA: local anaesthesia; ASA: American Society of Anaesthesiologists; SSC: stainless steel crowns; IQR: interquartile range; FLACC: Face, Legs, Activity, Cry, Consolability; PACU: post-anesthesia care unit; VAS: visual analogue scale; WBPS: Wong-Baker faces scale; NSAIDs: nonsteroidal anti-inflammatory drugs; STPPPS: simplified toddler-preschooler postoperative pain scale; MPDS: modified pain/discomfort scale.

Supplementary Table 5. Usage of topical local anaesthesia alone in post-operative analgesia.

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| No. | Reference  (Country of origin) | Type of study | Sample  A. Size (N)  B. Groups  C. Characteristics  D. Additional information | Diagnostic modality | Results | Inference (Yes/No)  \*Usage of analgesics to relieve post op pain |
| 1. | Andrzejowski *et al*. [34]  (United Kingdom) | Prospective study | A. N = 133  B. (i) Bupivacaine group  Mean age = 7 years  Range Group 1 = 7 years  Mean weight = 24 kg  Mean number of teeth extracted = 7  Unable to score for themselves due to age = 7  (ii) Saline group  Mean age = 6 years  Range Group 2 = 6 years  Mean weight = 22 kg  Mean number of teeth extracted = 8  Unable to score for themselves due to age = 6  C. (i) Age = 5 to 12 years  (ii) ASA = Class I or II  (iii) Undergoing general anaesthesia for simple extraction of 5 teeth or above. | Nurse & Self-assessment 4-point pain scoring tool at 15 & 30 mins after recovery. | Rectal diclofenac (1 mg/kg) was given during recovery and paracetamol was given as needed. | YES  There is no difference in pain scores between the two groups. |
| 2. | Gazal *et al*. [16]  (United Kingdom) | A double-blind randomized controlled trial | A. N = 135  B. After surgery the below was soaked and placed in sockets  (i) Bupivacaine group = 68  Male = 36, Female = 32  Mean teeth extracted = 7 ± 2.58  Mean weight = 22.2 ± 8.00 kg  (ii) Sterile water (control group) = 67  Male = 33, Female = 34  Mean teeth extracted = 6 ± 2.89 Mean weight = 22.1 ± 7.47 kg  C. (i) Age = 2 to 12 years  Mean age = 5.9 years  (ii) ASA = Class I or II  (iii) Undergoing general anaesthesia for simple extractions between 1–10 teeth  D. All pts received preop paracetamol (15 mg/kg). | A self-assessment 5-point pain scoring tool after surgery at 15 mins before discharge. | Both the groups experienced post-operative pain.  Children between aged 2–6 years had more distress scores when compared to 7–12 years. | NO  There is no evidence that topical anaesthetic solution (25% bupivacaine) provides pain relief postoperatively. |

ASA: American Society of Anaesthesiologists.