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The effect of mandibular nerve block on opioidconsumption, nausea and vomiting in bilateral mandibular osteotomies

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Summary : The purpose of this study was to compare the efficacy of a mandibular nerve block to placebo, in patients undergoing mandibular osteotomy surgery, regarding opioid consumption and adverse opioid induced side effects.
Fourty healthy individuals with a mean age of 19,7 years participated in the study. All subjects received lidocaïn 2% + adrenaline 1/80.000 versus placebo for mandibular nerve block in a randomized double-blind manner.
Opioid consumption and opioid related side effect such as postoperative nausea and vomiting (PONV), and respiratory depression were assessed.
Results : The placebo group received significantly more sufentanil during the surgical procedure than the lidocaïngroup. There were no significant differences in adverse opioid induced side effects.
In the postoperative phase there was no difference in additional pain intervention between the two groups.
Conclusion : The mandibular block during mandibular osteotomy reduces intra-operative opioid consumption but does not alternate the opioid related side-effects in the postoperative phase.

In the peri-operative phase opioids are used for pain management. In the postoperative phase their use is associated with nausea, vomiting and sometimes respiratory depression. Peripheral nerve blocks performed in combination with general anesthesia reduce the need for analgesics. The use of regional blocks reducing the need for peri-operative opioids, may decrease postoperative opioid associated side effects. A mandibular nerve block has been shown to be highly effective in dentistry with regard to pain blocking (1). The purpose of our study was to compare the efficacy of a mandibular nerve block to placebo, combined with peri-operative opioids, in patients undergoing mandibulary osteotomy surgery, regarding adverse opioid-induced side effects.

METHODS

With Ethics Committee approval and written informed consent we studied in a randomized, prospective double blind trial, 40 patients, ASA I, aged 16 to 50 years (mean 19,7 years), undergoing elective sagittal split osteotomies for mandibular lengthening.

They were randomly assigned to receive either 2 ml lidocain 2% and adrenaline 1/80.000% (L-group) or placebo (PL-group) as a mandibular nerve block (mnb). All patients were premedicated with perorally administered lorazepam 1 mg one hour before induction. Methylprednisolone 125 mg and cefamandol 2 gr were administered intravenously (IV). All patients received routine intra-operative monitoring. A 20 gauge cannula was placed in the radial artery for continuous arterial blood pressure monitoring. After baseline systolic blood-pressure was recorded, crystalloids (5 ml/kg), propofol (2-2.5 mg/kg), sufentanil (0,3 µg/kg) and vecuronium ((0,1 mg/) were administered. Anesthesia was maintained with desflurane (1 mac), 65% nitrous oxide in 0_2 and supplementary doses of sufentanil. Immediately after induction mnb was performed. Induced hypotension was started after the induction of an anesthesia and ended when bleeding was no longer expected. An initial dose of labetolol 10 mg iv was given in order to reach systolic arterial blood pressure between 75 and 85 mm Hg. Subsequent doses (10 mg, maximum 200 mg) were given as needed. After the operation patients were tracheal extubated by using standard extubation criteria. Patients were transported to the post-anesthesia care unit (PACU). Visual Analogue Scale (VAS) pain scores (0-10), sedation scores (0-3), respiratory rate and postoperative nausea and vomiting (PONV) requiring rescue medication were registered at the admission to the PACU at 15', 30', 45' and 60' and every 2 hours during the first 24 hours postoperatively.

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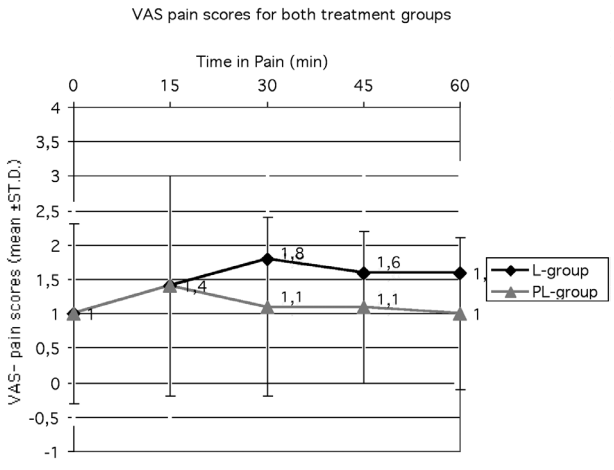

Fig. 1. — VAS pain scores for both treatment groups at the PACU. There were no significant differences between the groups.

Piritramide 3 µg/kg intramuscularly was administered if necessary. At the ward paracetamol 2 g IV was administered every 6 hours when deemed necessary. Demographic and clinical data were analyzed with Mann-Whitney and Chi-square tests for comparison between groups.

Conduction block for the sagittal split osteotomy

For a sagittal split osteotomy, the buccal soft tissues are incised and reflected in the territories of the buccal nerve, rarely the inferior alveolar nerve. The latter is involved only when the incision extends beyond the second premolar, in case of severe mandibular hypoplasia. The lingual nerve is involved during the lingual tunneling above the lingula. The bone splitting procedure happens in the territory of the inferior alveolar nerve.

The inferior alveolar and lingual nerves may be blocked by one injection (mandibular nerve block), whereas the buccal nerve and the cutaneous colli nerve, the latter sometimes innervating the area of the third molar, require a separate injection. The tunneling at the inferior mandibular border and the skin incision for the transbuccal osteosynthesis procedure, are usually not addressed with local anesthesia.

For mandibular conduction block, the patient's mouth should be widely open. After palpating the coronoid process with the thumb of the left hand, the index and middle finger are placed behind the ascending ramus, below the ear. The mandibular foramen is situated in a line between the thumb and the index finger. In the direct technique, the syringe is held parallel to the occlusal plane and is directed from the premolar region of the opposite side.

Table 1

Demographic data

	PL-group	L-group
Age (year)	20,3 ± 9,6	19,1 ± 5,8
Gender (M/F)	11/9	9/11
Weight (kg)	64,9 ± 10,1	66,1 ± 11,4
Duration of Surgery (Min.)	65,3 ± 12	67,0 ± 11,9

Legends : PL (placbo), L (lidocain).

Needle position for injection

The needle is inserted medially to the thumb, laterally to the pterygo-mandibular plica, about 1 cm above the occlusal plane. The needle is advanced dorsally and laterally until it meets the middle part of the ascending ramus, after which it is withdrawn 1 mm. Injection is done after careful aspiration.

When withdrawing the needle from the mandibular foramen, the lingual nerve is blocked at a point 1 cm medially and ventrally to the lingula.

The buccal nerve is blocked by an injection in the buccal mucosa laterally to the third molar, just above the occlusal level.

Results

Fourty patients completed the study. There were no differences in demographic data and there were no differences in operating time between the two groups. The PL-group received significantly more sufentanil during the surgical procedure than the L-group ($p < 0,05$) (table 2).

Table 2

Intra-operative sufentanil consumption in the PL-group and in the L-group ; PONV events requiring rescue medication and sedation at the PACU and at the ward

	PL-group	L-group	P
Nausea and vomiting requiering escape medication	14/40	8/40	= 0,057
Sedation at arrival of recovery	2.0 ± 0.7	2.0 ± 0.8	n.s.
Sedation 15' postoperatively	1.7 ± 0.8	1.5 ± 0.5	n.s.
30' postoperatively	1.3 ± .3	1.3 ± 0.4	n.s.
45' postoperatively	1.5 ± 0.6	1.4 ± 0.2	n.s.
60' postoperatively	1.4 ± 0.6	1.5 ± 0.2	n.s.
Sedation at the ward	1.0	1.0	n.s.
Total Sufentanil intraoperatively (µg)	27.6 ± 10.8	20.4 ± 8.0	XX

Legends : PONV (postoperative nausea and vomiting), PACU (post-anaesthesia care unit), PL (placebo), L (lidocain).
XX = $p < 0,05$.
n.s. = not significant.

Table 3

Patients Requiring Pain Rescue medication

	PL-group	L-group
PACU (piritramide 0,3 µg/Kg IM)	6	6
Ward (proparacetamol 2 g IV)	1	2

There were no differences in sedation at arrival at the PACU, in the further postoperative phase and in the ward. There was no significant difference between the groups in patients that experienced nausea and vomiting requiring rescue medication in the hospital ($p = 0,057$). In each group 6 patients received one dose of piritramide at the PACU. There were also no differences in additional pain interventions at the ward (table 3).

Mean VAS pain scores in the PACU for both treatment groups were low (< 3) and there were no significant differences between the groups (fig. 1).

Discussion

The aim of the study was to evaluate the effect of the perioperative use of the mandibular nerve block in mandibular base osteotomy surgery on pain relief as well as the reduction of the opioid induced side effects.

Opioid analgesics are associated with an increased incidence of emesis, sedation and respiratory depression which may delay discharge from PACU (2). Peripheral nerve blocks with local anesthetics can decrease the anaesthetic and analgesic requirements during surgery and reduce the need for opioid analgesics in the postoperative period.

There have been many clinical studies concerning the use of regional periferal anesthesia investigating if there was a reduction of perioperative analgesic medication. A systematic review of the use of regional block for postoperative analgesia for orthopedic surgery showed that there was improved pain relief after shoulder surgery (3) and after lower limb surgery (4). For other types of surgery such as abdominal, cesarean delivery, the evidence of the value of regional anesthesia was equivocal.

A study published by Sureh *et al.* (5) showed that in patients operated for tympanoplasty a great auricular nerve block (GAN) performed with bupivacaïne (0.25%) with epinephrine (1/80.000) provided analgesia that was effective in the total perioperative period. Nearly 50% of the patients in the GAN-block group even never received opioids or other analgesics at any time during the first 24 hr after surgery. The group receiving the GAN-block consequently had less PONV.

We performed balanced anesthesia using opioids in both groups because of other sources of pain not covered by the block, such as oral pain from the endotracheal tube and the possibility of incomplete block.

Despite the m.n.b. perioperative opioid dosage was high in the lidocain group (peroperative 20 microgram sufenta). Optimalisation of regional techniques and the use of adjuvants probably can result in further reduction of opioid dosage and side effects.

The use of peroperative opioids was higher in the control group than the lidocain-group, there was no difference in the use postoperative rescue analgesics between both groups. This is probably related to the fact that the lidocain-block was already ended at the PACU. Although lidocain, as routinely used in our institution, has proven his efficacy and safety, the use of long-acting anesthetics

will probably improve the quality of postoperative analgesia. This was already advocated by Casati (6) in bracheal plexus block and by Leoni (7) in cervical plexus anesthesia for carotid endarterecotmy.

The addition of adjuvants (e.g. clonidine) can also prolong the postoperative analgesia produced by peripheral nerve blocks (8).

We did not elicit a preoperative history of motion sickness nor did we take any supplementary measure to prevent PONV. So these variables were not assessed. Patients received routinely preoperative and postoperative steroids to prevent edema. Steroids are also known for their antiemetic effect (9). PONV was not significantly different between the two groups.

Our data suggest that mnb combined with opioids compared to opioids alone don't provide better analgesia in the postoperative period, nevertheless total opioid consumption seems to be less but without significant reduction of opioid related side effect.

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Résumé : Ph. VAN LANKER, J. V. S. ABELOOS, C. A. S. DE CLERCQ, M. Y. MOMMAERTS. *Titre.*

Nous avons examiné l'effect d'un block régional mandibulaire sur la consommation d'opioides et ces effects secondaires chez des patients opérer d'une osteotomie mandibulaire.

40 patients étaient opérés sous anesthésie générale.

Chez tous les patients les nerfs mandibulaire étaient injectés avec de la lidocaine 2% + adrénaline 1/80.000 ou placebo de manière randomiser en double aveugle.

La consommation d'opioides et les effects secondaire comme la nausée et les vomissement et la dépression respiratoire étaient controlé.

Resultat : Dans le group placebo la consommation intraopérative de sufentanil était significativement plus important que dans le group lidocaïn et il n'y avait pas de différence en effects secondaire lié aux opiacés en periode postopératoire.

Dans la phase postopérative il n'y avait pas de difference en consommation d'analgésique dans les deux groups.

Conclusion : Le block régional mandibulaire pendant la chirurgie des osteotomies mandibulaire diminue la consommation d'opiacés peropératoire. Il n'y a pas de difference en effects secondaires lié au opiacés dans la période postopératoire.

Samenvatting : Ph. VAN LANKER, J. V. S. ABELOOS, C. A. S. DE CLERCQ, M. Y. MOMMAERTS. *Titel.*

Wij onderzochten de efficiëntie van het mandibulair block uitgevoerd bij patiënten die geopereerd werden voor een onderkaakosteotomie. Wij bestudeerden meer specifiek de opiaatconsumptie en de aan de opiaten relateerde bijwerkingen zoals nausea, braken en respiratoire depressie.

Veertig patiënten met een gemiddelde leeftijd van 19,7 jaar voleindigden de studie. Het mandibulair block werd uitgevoerd met 2 ml Lidocaïne 2% + adrenaline 1/80.0000 versus placebo op een gerandomiseerde dubbel blinde manier.

Resultaten : In de placebogroep werd significant meer Sufentanil verbruikt tijdens de ingreep dan in de Lidocaïne groep. Er was geen verschil in de opiaat gerelateerde bijwerkingen.

In de postoperatieve fase was er geen verschil in hoeveelheid pijnstillers tussen de 2 groepen.

Conclusie : Het mandibulair block tijdens mandibulaire osteotomie verminderd de intra-operatieve opiaatconsumptie en verminderd de opiaatgebonden bijwerkingen in de postoperatieve fase.