

ACUTE POSTOPERATIVE PAIN AND ANALGESICS CONSUMPTION IN ORAL AND MAXILLOFACIAL SURGERY

IRINA CAZACU^{1*}, DANIEL-CORNELIU LEUCUTA², MIHAELA BACIUT³, GRIGORE BACIUT³, CRISTINA MOGOSAN¹, FRANÇOISE HARAMBURU⁴, ANNIE FOURRIER-RÉGLAT⁵, FELICIA LOGHIN⁶

¹Department of Pharmacology, Physiology and Pathophysiology, Faculty of Pharmacy, "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca 400012, Romania

²Department of Medical Informatics and Biostatistics, Faculty of Medicine, "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca 400012, Romania

³Department of Maxillofacial Surgery and Implantology, Faculty of Dentistry, Clinic of Oral and Maxillofacial Surgery, "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca 400012, Romania

⁴Regional Pharmacovigilance Centre, CHU de Bordeaux, INSERM U657, Department of Pharmacology, Bordeaux 33000, France

⁵University of Bordeaux, INSERM U657, Department of Pharmacology, Bordeaux 33000, France

⁶Department of Toxicology, Faculty of Pharmacy, "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca 400012, Romania

*corresponding author: cazacuirina@yahoo.com

Manuscript received: October 2015

Abstract

The aims of this study were to investigate the presence of postoperative pain in oral and maxillofacial surgery and to determine predictive factors for postoperative pain and analgesics consumption. A prospective observational study was conducted on patients admitted for surgery at the Clinic of Oral and Maxillofacial Surgery from Cluj-Napoca. Patients (n = 104) had a median age of 49.5 years old (interquartile range: 28-61). Surgery mainly consisted of tumour excision (41.4%) and oral surgery (22.1%), and postoperative analgesia was mainly assured by metamizole (38.4%) and ketoprofen (36.4%). Moderate-to-severe postoperative pain was reported by 44.2% of the patients. Psychological status and type of surgery were both correlated with postoperative pain and analgesic consumption. Identifying factors that could predict the presence of postoperative pain or the analgesic consumption helps initiate a prompt and effective pain treatment.

Rezumat

Obiectivele studiului au fost evaluarea durerii postoperatorii în chirurgia orală și maxilo-facială și determinarea factorilor predictivi pentru aceasta și consumul de medicamente analgezice. S-a realizat un studiu observațional prospectiv la pacienții spitalizați la Clinica de Chirurgie Orală și Maxilo-facială din Cluj-Napoca. Pacienții (n = 104) au avut vârsta medie de 49,5 ani (interval intercuartil: 28 - 61). S-a realizat în principal excizie tumorală (41,4%) și chirurgie orală (22,1%), iar metamizolul (38,4%) și ketoprofenul (36,4%) au fost principalele analgezice utilizate postoperator. Dintre pacienți, 44,2% au raportat durere postoperatorie moderată până la severă. Statusul psihologic și tipul de intervenție chirurgicală au fost factorii corelați atât cu durerea postoperatorie, cât și cu consumul postoperator de medicamente analgezice. Identificarea factorilor predictivi pentru durerea postoperatorie și consumul de analgezice poate contribui la inițierea unui tratament analgezic prompt și eficient.

Keywords: postoperative pain, analgesia, predictive factors, oral and maxillofacial surgery

Introduction

One of the major crises in pain management nowadays is the lack of evidence for the outcomes of pain interventions such as appropriateness of analgesia and effectiveness. Systematic screening of pain and response to pain and treatment are viewed as the first essential steps towards an improved pain management [5].

Pain is among the most common symptoms after surgery and a real challenge for health professionals:

moderate-to-severe acute postoperative pain was previously reported by up to 60% of the surgical patients [19, 21]. Several studies have attested that even if in the last decades there was an improvement in understanding and managing postoperative pain, being under treatment still remains a major public health problem [2, 4]. In Romania, general improvements in pain management have begun with the adoption of the new legislation in November 2005, concerning the medical use of opioids, but important steps are still needed in the field of pain management [17].

In oral and maxillofacial surgery, acute post-operative pain is expected by both patients and medical personal and can be usually explained by tissue damage, which promotes activation and sensitization of terminal nerve fibres. But it should and could be minimized. The aims of the present study were to determine the patterns of post-operative pain and predictive factors for the pain and postoperative analgesics consumption in patients undergoing oral and maxillofacial surgery in a Romanian medical unit.

Materials and Methods

A prospective observational study was conducted on patients hospitalized at the University Clinic of Oral and Maxillofacial Surgery from Cluj-Napoca, Romania during September 2014 - February 2015. Ethics Committee of the University of Medicine and Pharmacy of Cluj-Napoca approved the study protocol. Informed consent was obtained from all individual participants included in the study. Patients aged over 18 years old and hospitalized for surgery, scheduled at least the following day after hospitalization, were included. Clinical and demographic data were registered from medical records and interviews with patients and medical personal. Patients were asked to fill at admission the Hospital Anxiety and Depression Scale (HADS). Scores ranging from 0 to 21 for the two separate scales for anxiety and depression could be classified in: normal (0 - 7), mild (8 - 10), moderate (11 - 14) or severe cases (15 - 21) [22]. To evaluate the intensity of pain, the Numeric Rating Scale (NRS) was used before and 1, 4, 8, 12 and 24 hours after the surgery. Patients were asked to estimate their pain on a scale from 0 to 10 using whole numbers, where 0 represents "no pain" and 10 represents "the worst pain possible". Post-operative pain was considered moderate-to-severe when $NRS \geq 4$ [13]. In case of analgesia, the type of

analgesic administered and the number of administrations were recorded.

Statistical analysis

Qualitative data was presented as number and percentages; quantitative data by mean and standard deviations (SD) or median and interquartile range (IQR) for skewed data.

To assess the relationship of different predictors with the level of pain at different moments after the intervention, negative binomial regressions one for each corresponding NRS (as dependent variables), were performed. For each regression, a full model was started including all the possible variables and only for patients who presented postoperative pain, and then, using a stepwise backward/forward variable selection procedure with Akaike information criterion, the final models were obtained.

To evaluate the relationship between different possible predictors and the number of analgesics used after the surgery, a multiple linear regression was performed. All possible variables were used to build a full model, and then using a best subset variable selection with Bayesian information criterion the final model was obtained.

For all statistical tests the two tailed p value was used, and the level of statistical significance was set at 0.05. All analyses were carried out with the R environment for statistical computing and graphics, version 3.2.0.

Results and Discussion

A total of 104 surgical cases were included. Patients had the sex ratio male/female 1.26 and the mean age 45.9 years. Half of the patients (50%) presented co-morbidities, less than half (35.6%) were following a chronic medical treatment for their associated conditions, and three patients (2.9%) were having a diagnosis of anxiety disorder. Scores obtained with HADS at hospitalization showed mild-to-moderate depression and anxiety for respectively 43.3% and 32.7% of the patients (Table I).

Table I
Characteristics of patients (n = 104)

Variables		
Age years	Median (interquartile range)	49.5 (28 - 61)
Gender n (%)	Male	58 (55.8)
	Female	46 (44.2)
Body Mass Index (BMI) kg/m ²	Median (interquartile range)	24.5 (21.3 - 27.8)
Place of residence n (%)	Urban	72 (69.2)
	Rural	32 (30.8)
Psychological status		
HADS depression n (%)	normal	58 (55.8)
	mild	22 (21.2)
	moderate	23 (22.1)
	severe	1 (0.9)
HADS anxiety n (%)	normal	70 (67.3)
	mild	25 (24.0)
	moderate	9 (8.7)
	severe	0 (0)

The type of surgery performed on patients was benign or malign tumour excision (n = 43, 41.4%), followed by oral surgery (n = 23, 22.1%), orthognathic surgery (n = 17, 16.3%), salivary gland surgery (n = 13, 12.5%), and others (n = 8, 7.7%). The median duration of surgeries was 90 minutes (interquartile range: 60 - 150). Surgery was mainly conducted under general anaesthesia (n = 70, 67.3%), followed by local anaesthesia (n = 23, 22.1%) and potentialized local anaesthesia (n = 11, 10.6%).

Postoperative analgesia was mainly assured by intravenous *bolus* analgesia (96.2%) and the medicines most frequently used for the relief of pain were metamizole (38.4%), ketoprofen (36.4%), paracetamol (12.1%), ketorolac (11.7%), tramadol (0.7%), and others (0.7%). Mean number (SD) of all analgesic administrations in the first 24 hours after surgery was 3.7 (1.6). Postoperative anxiolytic treatment was administered to 15 patients (14.4%). Globally, moderate-to-severe postoperative pain was reported by 44.2% of the patients during the first postoperative day, with the most intensive postoperative pain reported 1 hour after the surgery (Figure 1).

Predictive factors for postoperative pain varied in function of the pain reported by patients at 1, 4, 8, 12 and 24 hours after the surgery. Main predictors detected for the postoperative pain reported 1 hour after the surgery were the presence of co-morbidities (Coef = 0.422, 95% CI: 0.175 - 1.014, p = 0.047), concomitant chronic treatment (Coef = 2.866, 95% CI:

1.176 - 6.983, p = 0.017), presence of preoperative pain (Coef = 0.875, 95% CI: 0.775 - 0.988, p = 0.026) and postoperative anxiolytic treatment (Coef = 2.759, 95% CI: 1.273 - 5.979, p = 0.008). The anxiety score was associated with the pain reported at 8, 12 and 24 hours after the surgery, while depression score with the pain reported at 12 and 24 hours (Table II).

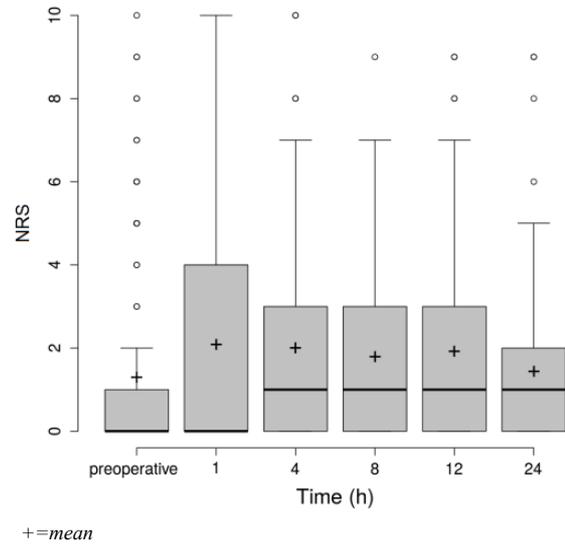


Figure 1. Preoperative and postoperative numeric rating scale (NRS)

Table II

Significant results of the negative binomial regression models for predicting postoperative pain in patients with postoperative pain only

	NRS 1h	NRS 4h	NRS 8h	NRS 12h	NRS 24h
Predictive factors	Coef (95% CI) p	Coef (95% CI) p	Coef (95% CI) p	Coef (95% CI) p	Coef (95% CI) p
Presence of co-morbidities	0.422 (0.175 - 1.014) 0.047		1.730 (1.165 - 2.571) 0.005	1.546 (1.073 - 2.228) 0.016	1.768 (1.119 - 2.795) 0.012
Presence of chronic treatment	2.866 (1.176 - 6.983) 0.017				0.520 (0.298 - 0.908) 0.018
Depression score				1.158 (1.075 - 1.247) < 0.001	1.125 (1.029 - 1.230) 0.008
Anxiety score			0.946 (0.898 - 0.996) 0.030	0.837 (0.769 - 0.911) < 0.001	0.869 (0.788 - 0.959) 0.004
Orthognathic surgery versus tumour excision				0.434 (0.220 - 0.856) 0.013	0.298 (0.139 - 0.640) 0.001
Presence of preoperative pain	0.875 (0.775 - 0.988) 0.026				1.119 (1.028 - 1.217) 0.007
Postoperative anxiolytic treatment				2.318 (1.464 - 3.669) < 0.001	2.083 (1.271 - 3.413) 0.002

The results of multiple linear regression showed that depression score ($\beta = 0.07$, 95% CI: 0.01 - 0.12, $p = 0.02$), local anaesthesia ($\beta = -1.36$, 95% CI: 1.88 - -0.84, $p < 0.001$), duration of surgery ($\beta = 0.01$, 95% CI: 0 - 0.01, $p < 0.001$), NRS at 8 hours ($\beta = 0.16$, 95% CI: 0.06 - 0.26, $p = 0.003$) and orthognathic surgery ($\beta = 1.52$, 95% CI: 0.94 - 2.11, $p < 0.001$) were associated with postoperative analgesic consumption.

This is a first study reporting the prevalence of postoperative pain and the predictive factors for pain and analgesic consumption in oral and maxillofacial surgery in Romania. Postoperative pain was present in patients after surgery in different degrees of intensity, with 44.2% of them reporting moderate-to-severe pain in the first 24 hours postoperatively. NRS was chosen to increase the compliance of patients in responding due to its accessibility and ease of use [9, 14, 16].

Patients could experience pain after invasive procedures and it was argued that postoperative pain should not be completely relieved due to its protective role. In case of oral and maxillofacial surgery its low intensity presence might protect from wound damage due to talking and eating. However, postoperative pain should be reduced until it no longer causes distress [7]. The pain scores reported in the present study could highlight that patients may not be comfortable yet with the efficacy of analgesics and the advantages of preventing pain, rather than treating it reactively [8, 10, 11].

A German study on patients rating their worst pain intensity since surgery on the first postoperative day in different surgical wards found that oral and maxillofacial surgery was among surgical specialties with the lowest pain scores recorded [12]. Considering these findings, further research is also needed to evaluate the postoperative pain in the context other surgical specialties.

Metamizole was the most frequently used analgesic for the relief of pain and it remains in Romania one of the most popular analgesics [1]. Another Romanian study showed that metamizole was also the main drug to assure postoperative analgesia. The study, conducted in four university hospitals, included all patients having surgery which were screened for postoperative pain scores and analgesia in the first postoperative 48 hours. High pain scores three hours after surgery had significantly influenced the quality of life in the postoperative period [6].

Generally, opioids are considered essential medicines in the management of pain and their consumption represents a suggestive indicator of adequate pain relief. The use of an opioid analgesic was seldom observed in the present study. Factors related to Romanian health-care system that generally contribute to low opioid use and possibly to increased postoperative pain scores could be: the restrictive and tangled policies that have to be applied when

prescribing opioids, inadequate and limited availability of opioids in hospital setting, and fear of professionals and patients towards the use of opioids because of their potential adverse drug reactions and addiction [17, 18].

Pain could be influenced by different factors. This study found that patients presenting co-morbidities, patients following a concomitant chronic treatment, or having a certain type of surgery reported higher postoperative pain scores. The presence of preoperative pain or higher anxiety and depression scores had also predicted greater postoperative pain. Only preoperative pain, anxiety and type of surgery were the factors similar to the ones found within another study, a qualitative systematic review, which found also the age of patients as a predictor for postoperative pain [15]. Depression score, type of surgery, type of anaesthesia and duration of surgery were predictors for postoperative analgesic consumption. The frequency of analgesic administrations was also greater when the pain was more often, as reported at 8 hours after the surgery. Psychological status and type of surgery were the factors both correlated with postoperative pain and analgesic consumption. The single surgical unit and the number of patients included in the study may limit the representativity of the results. Even so, this study represents an important insight on the postoperative pain in oral and maxillofacial surgery. Moreover, opportunities to improve pain management were found. Introduction of a validated tool to assess pain, a practice not yet systematic in many settings in Romania, along with the awareness of predictive factors could contribute to healthcare improvement and also to the choice of the adequate analgesic treatment with its setting at the right time [3, 20].

Conclusions

The present study identified the prevalence of acute postoperative pain in oral and maxillofacial surgery and the predictive factors for postoperative pain and analgesic consumption. Evaluation and education is needed continuously in the field of postoperative pain in order to assure an appropriate, early and effective pain management.

Acknowledgement

This paper was published under the frame of European Social Found, Human Resources Development Operational Programme 2007-2013, project no. POSDRU/159/1.5/136893.

References

1. Alexa I., Pancu A., Morosanu A., Ghiciuc C., Lupusoru C., Prada G., Cepoi V., The impact of self-medication

- with NSAIDs/analgesics in a Northeastern region of Romania. *Farmacia*, 2014; 62: 1164-1170.
2. Benhamou D., Berti M., Brodner G., De Andres J., Draisci G., Moreno-Azcoita M., Neugebauer E.A.M., Schwenk W., Torres L.M., Viel E., Postoperative Analgesic Therapy Observational Survey (PATHOS): a practice pattern study in 7 central/southern European countries. *Pain*, 2008; 136(1-2): 134-141.
 3. Binhas M., Roudot-Thoraval F., Bonnet F., Guerineau S., Lory C., Jeanblanc G., Kluger M.D., Marty J., Use of a validated reference tool to evaluate postoperative pain management through a quality-improvement program in a university hospital. *J. Healthc. Qual.*, 2011; 33(1): 7-13.
 4. Breivik H., Stubhaug A., Management of acute postoperative pain: still a long way to go! *Pain*, 2008; 137(2): 233-234.
 5. Carr E.C.J., Meredith P., Chumbley G., Killen R., Prytherch D.R., Smith G.B., Pain: a quality of care issue during patients' admission to hospital. *J. Adv. Nurs.*, 2014; 70(6): 1391-1403.
 6. Chițac L.C., Cojocaru I., Beșchea S., Neamțu M., Bulea D., Bild V., Evaluation of antinociceptive action of binary combinations of sodium valproate and analgesic drugs. *Farmacia*. 2015; 63(3): 460-464.
 7. Coulthard P., Bailey E., Patel N., Coulthard M.B., Pain pathways and pre-emptive and protective analgesia for oral surgery. *Oral Surg.*, 2014; 7(2): 74-80.
 8. Coulthard P., Haywood D., Tai M.A., Jackson-Leech D., Pleuvry B.J., Macfarlane T.V., Treatment of postoperative pain in oral and maxillofacial surgery. *Br. J. Oral Maxillofac. Surg.*, 2000; 38(6): 588-592.
 9. Coulthard P., Patel N., Bailey E., Coulthard M.B., Measuring pain after oral surgery. *Oral Surg.*, 2014; 7(4): 203-208.
 10. Crawford F.I.J., Armstrong D., Boardman C., Coulthard P., Reducing postoperative pain by changing the process. *Br. J. Oral Maxillofac. Surg.*, 2011; 49(6): 459-463.
 11. van Dijk J.F.M., van Wijck A.J.M., Kappen T.H., Peelen L.M., Kalkman C.J., Schuurmans M.J., The effect of a preoperative educational film on patients' postoperative pain in relation to their request for opioids. *Pain Manag. Nurs.*, 2015; 16(2): 137-145.
 12. Gerbershagen H.J., Aduckathil S., van Wijck A.J.M., Peelen L.M., Kalkman C.J., Meissner W., Pain intensity on the first day after surgery: a prospective cohort study comparing 179 surgical procedures. *Anesthesiology*, 2013; 118(4): 934-944.
 13. Gerbershagen H.J., Rothaug J., Kalkman C.J., Meissner W., Determination of moderate-to-severe postoperative pain on the numeric rating scale: a cut-off point analysis applying four different methods. *Br. J. Anaesth.*, 2011; 107(4): 619-626.
 14. Hjermstad M.J., Fayers P.M., Haugen D.F., Caraceni A., Hanks G.W., Loge J.H., Fainsinger R., Aass N., Kaasa S., Studies comparing Numerical Rating Scales, Verbal Rating Scales, and Visual Analogue Scales for assessment of pain intensity in adults: a systematic literature review. *J. Pain Symptom. Manage.*, 2011; 41(6): 1073-1093.
 15. Ip H.Y.V., Abrishami A., Peng P.W.H., Wong J., Chung F., Predictors of postoperative pain and analgesic consumption: a qualitative systematic review. *Anesthesiology*, 2009; 111(3): 657-677.
 16. Kanatas A.N., Rogers S.N., A systematic review of patient self-completed questionnaires suitable for oral and maxillofacial surgery. *Br. J. Oral Maxillofac. Surg.*, 2010; 48(8): 579-590.
 17. Mosoiu D., Mungiu O.C., Gigore B., Landon A., Romania: changing the regulatory environment. *J. Pain Symptom. Manage.*, 2007; 33(5): 610-614.
 18. Mosoiu D., Ryan K.M., Joranson D.E., Garthwaite J.P., Reform of drug control policy for palliative care in Romania. *Lancet*, 2006; 367(9528): 2110-2117.
 19. Pavlin D.J., Chen C., Penaloza D.A., Buckley F.P., A survey of pain and other symptoms that affect the recovery process after discharge from an ambulatory surgery unit. *J. Clin. Anesth.*, 2004; 16(3): 200-206.
 20. Roceanu A., Antochi F., Bajenaru O., New molecules in migraine treatment. *Farmacia*, 2015; 63(4): 475-481.
 21. Sommer M., de Rijke J.M., van Kleef M., Kessels A.G.H., Peters M.L., Geurts J.W., Gramke H.F., Marcus M.A.E., The prevalence of postoperative pain in a sample of 1490 surgical inpatients. *Eur. J. Anaesthesiol.*, 2008; 25(4): 267-274.
 22. Zigmond AS, Snaith RP., The hospital anxiety and depression scale. *Acta Psychiatr. Scand.*, 1983; 67(6): 361-370.