Opioid Prescribing Can Be Reduced in Oral and Maxillofacial Surgery Practice

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Purpose: Pain management is one of the most critical aspects of practice in oral and maxillofacial surgery. The purpose of this study was to measure the change in strong (stronger than codeine 30 mg) opioid use after introducing the standardized protocol ("office protocol") designed for opioid-free postoperative pain management.

Materials and Methods: This is a retrospective cohort study of patients who had surgical procedures performed at the NorthShore Center for Oral and Facial Surgery (Gurnee, IL). Data of patients who underwent qualified surgical procedures and filled prescriptions for strong opioids before and after introduction of the office protocol were analyzed. The primary predictor variable was introduction of the office protocol. The primary outcome variable was filling of a strong opioid prescription that was correlated to pain control as assessed by patients. Age and gender distributions also were analyzed. Proportions and associated 95% confidence intervals were used to compare the number of hydrocodone or oxycodone (strong) prescriptions filled by patients during a 3-year interval.

Results: In March 2016, the office protocol for pain management, designed to decrease opioid use, was introduced. In 2015 (before introduction of the office protocol), 2,016 adult patients (15 to 85 yr old) underwent qualified surgical procedures at the author's practice, 1,184 (59%) of whom required and filled strong opioid prescriptions. In 2017 (2 yr after introduction of the office procedure) that number decreased to 19%, whereas the number of qualified surgical procedures performed remained relatively the same between the years. Postoperative pain control was not qualitatively measured but was assumed adequate and correlated with the filling of a strong opioid prescription or requiring a refill, which would be recorded as part of total prescriptions filled.

Conclusion: A 3-fold decrease in hydrocodone or oxycodone prescription fill was seen at the 2-year interval. As alternatives, nonsteroidal anti-inflammatory drugs, acetaminophen, and a homeopathic recovery kit (Vega Recovery Kit, StellaLife, Glenview, IL) were used for pain management for patients undergoing various oral surgery procedures.

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Pain management is one of the most critical aspects of practice in oral and maxillofacial surgery (OMS). The ability to control pain directly affects patients' overall experience. This article describes different techniques that can be implemented to decrease the number of strong (stronger than codeine 30 mg) opioids prescribed in OMS practice.

The current dental model for pain management has been in place since the 1980s. It consists of opioids, nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen (APAP), and adjuncts, such as long-acting local anesthesia.[1,2] The opioid prescription rate per 1,000 dental patients increased from 130.58 in 2010 to 147.44 in 2015.[3] An American Dental Association survey suggested that although most oral and maxillofacial surgeons (74%) preferred that patients use ibuprofen after third molar extraction, 85% also prescribed an opioid analgesic after the procedure (most commonly hydrocodone or oxycodone).[4]

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Conflict of Interest Disclosures: Dr Tatch owns shares of the StellaLife Company.

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OPIOIDS

This class of drugs produces its action by working as an agonist at opioid receptors.

Patients who consume opioids regularly for longer than a week can develop some degree of dependence.[5] After repeated administration of opioids, patients develop a tolerance and require higher doses to produce adequate pain relief.[6,7]

NONOPIOID ANALGESIC

This class of drugs is divided into NSAIDS and APAP.

NSAIDs decrease the synthesis of prostaglandins responsible for pain, fever, and inflammation by acting as cyclo-oxygenase (COX)-1 and COX-2 inhibitors. The mechanism of action of APAP is believed to involve inhibition of prostaglandin synthesis within the central nervous system and indirect activation of cannabinoid type 1 receptors.[8,9]

NSAIDs and APAP exhibit a "ceiling" effect in which higher doses do not provide further analgesia. The "ceiling" dose is 400 mg for ibuprofen and 1,000 mg for APAP.

Some studies have shown that the combination of NSAIDs and APAP provide greater analgesia than opioids at conventional dosages.[10-12]

LONG-ACTING LOCAL ANESTHETICS

Exparel (bupivacaine liposome injectable suspension; Pacira Pharmaceuticals, Parsippany, NJ) was recently introduced to the market. It is a formulation of bupivacaine in a liposomal form that offers patients up to 72 hours of anesthesia and can substantially decrease the need for opioids.[13] However, the cost associated with the injection can be a concern in private practice.

OTHER ALTERNATIVES

Arnica contains phenolic and flavanoid compounds that lower expression levels of nitric oxide, tumor necrosis factor-α, and interleukins (1β, 6, and 12).[14] *Arnica montana* also has been found to stimulate extracellular matrix gene expression in a macrophage cell line differentiated to a wound-healing phenotype.[15] Aconitum has been found by many studies to display long-acting local anesthetic properties in vitro and in vivo. The mechanism seems to be through the decrease of neuronal sodium currents in a use-dependent manner.[16,17] One of the active alkaloids of *Gelsemium* species is koumine, which has been found to have anti-allodynia and neuroprotective effects. It has been further recommended for use in diabetic neuropathy.[18,19] Further, *Gelsemium* species has been found to alleviate neuropathic pain and sleep disturbances.[20] Alpha-bisabolol, one of the essential oils isolated from chamomile, has been shown to decrease nervous excitability by the blockade of voltage-dependent sodium channels.[21] Chamomile also has been found to exhibit selective COX-2 inhibitor function.[22] In a recently published double-blinded randomized controlled study, chamomile was found to be a safe, well-tolerated, and effective treatment for women with moderate mastalgia.[23] Calendula has been found to have considerable benefits in the treatment of diabetic foot ulcers and venous leg ulcers.[24,25]

The VEGA Oral Recovery Kit by StellaLife (Glenview, IL) used in this study is based on Homeopathic Pharmacopeia of United States principles and has 14 active ingredients (including those listed earlier).

The purpose of this 3-year retrospective study was to measure changes in strong opioid use in the author's practice after the introduction of an office protocol designed to offer alternatives to opioids for postoperative pain management. The hypothesis was that, after introduction of the office protocol, a marked decrease of strong opioid use would be achieved. The specific aim of this study was to compare strong opioid fills by patients undergoing qualified surgical procedures before and after introducing the office protocol. Postoperative pain control was not qualitatively measured but was assumed adequate and correlated with filling of a strong opioid prescription or requiring a refill, which would be recorded as part of the total prescriptions filled.

Materials and Methods

STUDY DESIGN AND SAMPLE

To address the research purpose, a retrospective cohort analysis was designed and implemented. Prescription fill of strong opioids issued to patients annually who underwent qualified surgical procedures was analyzed and compared before and after introduction of the office protocol. The number of qualified surgical procedures performed annually also was compared before and after introduction of the office protocol. The study population was composed of all patients who underwent qualified surgical procedures at the NorthShore Center for Oral and Facial Surgery (Gurnee, IL) from March 2015 through March 2018.

INCLUSION CRITERIA

The study population included patients who underwent the following qualified surgical procedures: removal of impacted third molars; complex guided bone regeneration or bone reconstructions, including onlay and interpositional bone grafting; lateral sinus lifts; and dental implantation, including full-arch dental implant rehabilitation with immediate occlusal loading. Prescriptions of strong opioids for

postoperative pain management after these procedures are routinely given.

EXCLUSION CRITERIA

Procedures such as biopsy sampling, facial trauma, routine extractions, cosmetic procedures, and orthognathic surgeries were excluded because these procedures routinely do not require opioid pain medications for the postoperative course and difficulty in monitoring pain management in a hospital setting.

STUDY VARIABLES

The primary predictor variable was introduction of the office protocol. The primary outcome variable was filling of a strong opioid prescription, which was correlated to pain control as assessed by patients. Age and gender distributions also were analyzed. Proportions and associated 95% confidence intervals (CIs) were used to compare the number of hydrocodone or oxycodone (strong) prescriptions filled by patients during a 3-year interval.

OFFICE PROTOCOL

The office protocol was designed to optimize preemptive analgesia using NSAIDs, APAP, and a homeopathic kit. Patients on the VEGA Recovery Kit started using it 3 days preoperatively and continued for 7 days postoperatively. VEGA gel was applied to the surgical site immediately postoperatively. Patients took APAP 1,000 mg and ibuprofen 400 mg immediately postoperatively. This combination was repeated up to 4 times per day without exceeding the allowable daily dose.

DATA COLLECTION METHODS

Data on patients who underwent qualified surgical procedures were obtained from the office practice management software (OMSVision, American Fork, UT) based on specific Code on Dental Procedures and Nomenclature codes corresponding to procedures that were listed for inclusion criteria.

Data on the number of patients, including their gender and age, who were seen at the author's practice and filled prescriptions for strong opioids (hydrocodone and oxycodone) during the same interval were obtained through the Illinois Prescription Monitoring Service.

DATA ANALYSES

The author compared the proportions of qualified procedures performed in the practice annually from March 2015 to March 2018 that coincided with filled strong opioid prescriptions over a 3-year period that included 1 year before and 2 years after introduction of the office protocol (BOP and OPY2). Age and gender distributions also were analyzed. Proportions and associated 95% CIs were used to compare the number of hydrocodone and oxycodone (strong) prescriptions filled by patients during the 3-year interval.

This study was granted an exemption by an institutional review board.

Results

During the study interval, the author screened all patients who were seen at the NorthShore Center for Oral and Facial surgery during a 3-year period. The final sample was composed of 6,055 patients who underwent qualified surgical procedures in that timeframe.

Total proportions of patients filling strong opioid prescriptions decreased over the 3 years of the study (BOP, 59%; 95% CI, 57-61; OPY2, 19%; 95% CI, 18-21; relative risk, 0.32; Table 1).

The distributions of qualifying procedures were similar from year to year (Table 2). Patients who filled prescriptions were similar in age and gender from BOP to year 1 after introduction of the office protocol ($P < .01$), but those at OPY2 were slightly older on average and were more likely to be men (Table 3).

Table 1. TOTAL PROPORTIONS OF PATIENTS FILLING STRONG OPIOID PRESCRIPTIONS DURING 3-YEAR STUDY

	BOP	OPY1	OPY2
Total qualified* cases performed, including	2,016	2,005	2,034
Prescription of hydrocodone or oxycodone	1,184	899	387
Procedures leading to filled prescriptions, % ($P < .01$)	58.7	44.8	19.0
95% confidence intervals	56.7-60.5	42.3-46.6	17.7-20.8

Abbreviations: BOP, before office protocol; OPY1, 1 year after office protocol introduction; OPY2, 2 years after office protocol introduction.

* Qualified cases include impacted third molar removal; guided bone regeneration, bone augmentation, and reconstruction; sinus lift; dental implantation; and full-arch reconstruction (all on 4-6).

Table 2. DISTRIBUTION OF QUALIFIED PROCEDURES BY YEAR

	Year						
	BOP (n = 2,016)		OPY1 (n = 2,005)		OPY2 (n = 2,034)		
Procedure	n	%	n	%	n	%	*P* Value
Impacted teeth removal	443	22	568	28	498	24	<.01
Bone augmentation and reconstruction	787	39	708	35	720	35	.02
Sinus lift	47	2	60	3	109	5	<.01
Dental implants	706	35	626	31	656	32	.03
Full-arch reconstruction, all on 4-6	33	2	43	2	51	3	.15

Abbreviations: BOP, before office protocol; OPY1, 1 year after office protocol introduction; OPY2, 2 years after office protocol introduction.

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Discussion

The purpose of this 3-year retrospective study was to evaluate strong opioid prescription and usage in the author's practice after introduction of the office protocol designed to offer alternatives to strong opioids for postoperative pain management after oral surgeries. The hypothesis was that a decrease of strong opioid use would be achieved without compromising the patients' postoperative pain control. Based on the 95% CIs, 58.7% of patients undergoing qualified surgical procedures required strong opioid prescriptions in 2015 (BOP). At OPY2, that number decreased to 19.0%.

The number of surgical procedures performed in the author's practice on the annual bases that fulfilled the inclusion criteria for this study did not vary substantially from 2015 through 2017. The 3-fold decrease of strong opioid use in the practice coincided with the introduction of the office protocol. However, it is difficult to establish a direct link between the decrease of strong opioid use and the office protocol based on this retrospective study alone. Postoperative pain control was not qualitatively measured but was assumed adequate and correlated with filling of strong opioid prescription or requiring a refill, which would be recorded as part of total prescriptions filled.

Iero et al[25] in a recently published study found that patients who underwent full mouth rehabilitation with dental implants and received an opioid-sparing postsurgical pain management protocol with liposomal bupivacaine 266 mg reported a statistically relevant decrease of postsurgical pain and a clinically relevant decrease in opioid consumption.

In this retrospective study, the effects of an opioid-decreasing protocol that was implemented in a single-surgeon oral surgery practice were analyzed. All procedures performed in this study were completed by the same surgeon, thus further decreasing the variables. The assumption of this study was that all patients had adequate postoperative pain control because they did not require stronger pain medications. In future prospective studies, patients could be given the Health-Related Quality of Life Questionnaire to further evaluate their pain control.[26]

SUMMARY

In the past 2 years, the author has effectively decreased the number of hydrocodone or oxycodone prescriptions filled. As an alternative, he optimized the use of nonopioid pain medications, pre-emptive analgesia, and available alternative options such as the Vega Recovery Kit.

Table 3. DISTRIBUTION OF GENDER AND AGE BY YEAR AMONG THOSE WHO FILLED HEAVY-OPIOID PRESCRIPTIONS

	BOP (n = 1,184)	OPY1 (n = 899)	OPY2 (n = 387)	*P* Value
Men, %	46	46	50	.33
Age (yr), mean	45	44	38	<.01

Abbreviations: BOP, before office protocol; OPY1, 1 year after office protocol introduction; OPY2, 2 years after office protocol introduction.

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Further studies should be designed to perform a similar analysis for a prospective multicenter study using the office protocol and qualitatively measuring patients' postoperative pain control.

Schroeder et al[27] in a recently published study concluded that dental opioid prescriptions can be associated with subsequent opioid use and opioid abuse. Regardless of a potential bias of these data, the question remains as to whether opioid prescription can be decreased in oral surgery without compromising postoperative pain control.

The author believes that every OMS practice can effectively decrease the number of opioids prescribed. Patients' education is an integral part of this process. Explaining to patients the rationale for pain management and assuring them that pain control is the most important concern will instill confidence in patients. This report presents an office protocol that could be a first step in decreasing opioid prescriptions in oral surgery practice. Adopting different options could help the oral and maxillofacial surgeon effectively decrease opioid prescriptions without compromising patients' pain management.

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