Original Investigation

The Efficacy of Oral Celecoxib for Acute Postoperative Pain in Face-lift Surgery

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IMPORTANCE Exploring methods of potentially improving patient comfort and pain control in cosmetic facial surgery.

OBJECTIVE To examine the effects of celecoxib in reducing pain and possible opioid consumption following face-lift surgery.

DESIGN, SETTING, AND PARTICIPANTS We reviewed the medical records of 100 patients: 50 consecutive patients who underwent a face-lift without receiving perioperative celecoxib and 50 patients who underwent face-lift and received immediate preoperative and standing postoperative celecoxib.

MAIN OUTCOMES AND MEASURES In addition to demographic information, the following outcome measures were recorded for each group: visual analog scale patient-reported pain, acetaminophen and/or opioid consumption rates, and related analgesic adverse effects.

RESULTS The participants in the noncelecoxib vs celecoxib groups had similar demographic characteristics: mean age, 59.6 vs 57.9 years; mean BMI, 23.3 vs 22.3; history of chronic pain or opioid use, 7 (14%) vs 6 (12%); and 94% of both groups were women. Postoperative pain scores were higher in the noncelecoxib vs celecoxib groups; mean (SD) overall pain score was 3.88 (2.20) vs 2.31 (2.36) ($P < .001$). The noncelecoxib group had a higher number of postoperative opioid doses than did the celecoxib group: 9.40 (4.30) vs 5.18 (4.58) ($P < .05$). The noncelecoxib group had a higher incidence of postoperative nausea and vomiting: 12 (24%) vs 0 in the celecoxib group.

CONCLUSIONS AND RELEVANCE Preemptive treatment with oral celecoxib appears to be effective in decreasing acute postoperative pain and opioid consumption in patients undergoing face-lift. Given the well-documented adverse effects of opioids, celecoxib is a desirable alternative.

LEVEL OF EVIDENCE 3.

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Face-lift or rhytidectomy is a cornerstone procedure in facial rejuvenation and is rising in popularity.[1] While most patients generally report positive overall experiences, elevated pain levels and accompanying opioid consumption can potentially hinder an otherwise excellent surgical effort and outcome.[2,3] Despite the known adverse effects of nausea, vomiting, dizziness, drowsiness, sedation, pruritus, and urinary retention associated with opioid analgesics, they are an established tool in controlling postoperative pain.[4,5] Publications over the last 2 decades outside of the ambulatory cosmetic surgery realm have described the technique of preemptive analgesia for abating postoperative pain. This approach has shown fewer adverse effects, better pain control, faster recovery, and less social burden on the patient than the use of postoperative opioids.[6,7]

Nonsteroidal anti-inflammatory drugs (NSAIDs), particularly cyclooxygenase 2 (COX-2) inhibitors may have inhibitory effects in prostaglandin production in both the spinal cord and peripheral nervous system. This is theorized to be responsible for their role in reducing the hyperalgesia state following surgical trauma.[8] Although celecoxib possesses analgesic effects similar to those of classic NSAIDs, it lacks the adverse effects of antiplatelet function, increased risk of gastric ulceration, bleeding, and bronchospasm in patients sensitive to aspirin.[9] Increased risk of myocardial infarction and hypertension has been associated with the COX-2 inhibitors valde-

coxib and rofecoxib, leading to their removal from the market. Short, periodic use of celecoxib, however, has not been associated with any adverse cardiovascular effects.[10,11]

While prior studies have demonstrated the efficacy of COX-2 inhibitors in perioperative pain control in orthopedic[12,13] and major plastic surgery procedures (abdominoplasty and breast augmentation),[14-16] no studies to our knowledge have addressed the effects of celecoxib in the setting of ambulatory cosmetic facial surgery. The objective of the present study was to determine the effect of celecoxib in controlling pain following face-lift surgery. We hypothesized that pain levels and opioid consumption between the control and intervention groups would not be similar.

Methods

Because all patient data were deidentified before publication, the Lenox Hill Hospital institutional review board granted exemption for all aspects of this study. Medical records were reviewed for a series of consecutive patients who underwent a complete, platysma muscle suspension, deep-plane facelift by the senior surgeon (D.B.R.). The technique used was a modification of a deep-plane rhytidectomy in which the platysma muscle is isolated and identified within the face and neck. Further detailed descriptions of this technique have been reported previously.[17,18]

Patients were categorized into 2 groups by their pain control regimen. All patients who underwent face-lifts between May 2, 2013, and August 22, 2013, were recorded as the noncelecoxib group. All patients who underwent face-lifts between August 27, 2013, and December 10, 2013, were recorded as the celecoxib group. The only exclusion criterion was the presence of any NSAID or sulfa allergy that precluded the administration of celecoxib.

The following medication regimen was administered to all patients unless otherwise noted: diazepam, 5 mg, was taken by the patient on waking on the morning of surgery. An additional 5 mg was given to the patient 30 minutes prior the procedure. All female patients also received 50 mg of dimenhydrinate just prior to the procedure. General anesthesia was initiated with inhalational sevoflurane and maintained with a propofol drip. Intraoperatively, the patient also received 5 to 10 mg of dexamethasone, 8 mg of ondansetron, 2 to 3 mg of midazolam, and 1 or 2 doses of fentanyl, 50 µg. Postoperatively, pain was controlled with the combination drug oxycodone/acetaminophen, 5 mg/325 mg, and/or acetaminophen, 500 mg. Fentanyl was available a rescue medication for breakthrough pain in the recovery room only.

Those in the celecoxib group received 200 mg of celecoxib on the night prior to surgery and in the morning of surgery on waking. They then received a standing regimen of celecoxib, 200 mg, every 12 hours for 5 days. All patients remained in the recovery room for up to 6 hours and had a 24-hour nurse for at least 48 hours.

Patients' medical records were examined for their age, sex, body mass index (BMI), and history of preexisting chronic pain issues or opioid use. Pain levels were recorded at intervals of 1, 2, 6, 24, and 48 hours with a standard visual analog scale (0, no pain; 10, the worst unbearable pain). Total doses of oxycodone/acetaminophen 5 mg/325 mg and acetaminophen 500 mg over the 48-hour recovery period were recorded for each patient. Sedation scores were recorded at intervals of 6, 24, and 48 hours (1, fully aware; 2, awake but drowsy; 3, asleep but capable of following verbal orders; 4, asleep but responsive to tactile stimulus; 5, drowsy and unresponsive to any stimulus). Patient medical records were also evaluated for the presence or absence of any postoperative nausea and/or vomiting throughout the 48-hour recovery period. Levels of significance for quantitative variables were analyzed with the unpaired *t* test. Statistical analysis was conducted with SPSS software, version 22.0 (IBM Corporation) for Windows (Microsoft Corporation).

Results

A total of 100 patients (50 in each group) were included in the study. There were no significant differences between groups in age or BMI (**Table 1**), no major difference in the prevalence of preexisting pain or opioid use, and no substantial difference in the types of accompanying procedures performed in both groups (**Figure**). Pain levels, however, were significantly lower in the celecoxib group for all time intervals (**Table 2**; Figure). Total oxycodone/acetaminophen administration, nausea, and late sedation (24 and 48 hours) were all significantly lower in the celecoxib group (**Table 3** and **Table 4**; Figure). However, there was no significant difference between groups in acetaminophen use and early sedation (6 hours).

Discussion

Pain is an unpleasant experience, particularly in the setting of elective cosmetic surgery, where patient comfort is paramount. Physiologically, acute pain is related to tissue damage releasing various chemical mediators including histamine, bradykinin, prostaglandin, leukotriene, serotonin, and substance P. These mediators in turn activate pain receptors. One of the approaches to pain control is prevention by central nervous system desensitization.

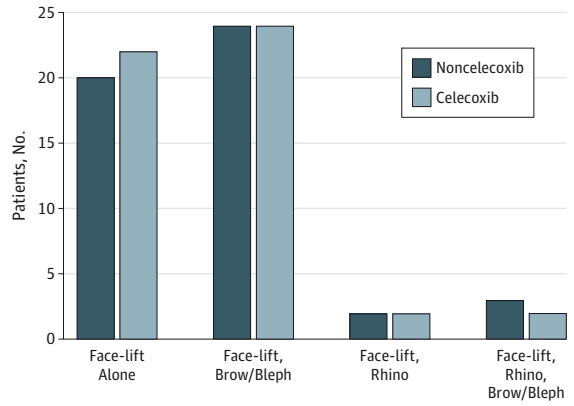
Prior studies in the orthopedic literature have explored the efficacy of perioperative celecoxib with decreased morphine dependence following open and arthroscopic knee surgery.[12,13] Parsa et al[14,16] and Sun et al[15] have reported the use of preemptive celecoxib and gabapentin in abdominoplasty and

Table 1. Patient Characteristics in Both Study Groups

Characteristic	Noncelecoxib	Celecoxib	*P* Value
Age, mean (SD), y	59.3 (7.32)	57.9 (7.97)	.36
Female sex, No. (%)	47 (94)	47 (94)	NR
BMI, mean (SD)	23.3 (3.32)	22.3 (2.92)	.08
History of chronic pain or opioid use, No. (%)	7 (14)	6 (12)	NR

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); NR, not reported.

Figure. Surgical Procedure Types in the Noncelecoxib and Celecoxib Face-lift Groups



Brow/Bleph indicates brow-lift and/or blepharoplasty; Rhino, rhinoplasty.

Table 2. Mean (SD) Pain Scores[a] for Each Group at Designated Postoperative Measurement Times

Postoperative Time, h	Noncelecoxib	Celecoxib	*P* Value
1	3.54 (2.79)	1.08 (2.39)	<.001
2	2.16 (1.82)	1.06 (2.05)	.006
6	5.38 (1.40)	3.68 (2.17)	<.001
24	4.62 (1.61)	3.26 (2.13)	<.001
48	3.70 (1.67)	2.48 (1.78)	<.001
Overall pain	3.88 (2.20)	2.31 (2.36)	<.001

[a] Mean pain scores (visual analog scale) in both groups (1, no pain; 10, the worst unbearable pain).

breast augmentation, where postoperative pain may be potentially significant. The present study is the first to our knowledge to demonstrate the efficacy of perioperative celecoxib in abating opioid dependence following elective cosmetic facial surgery. Although the prior studies involved procedures in which pain and massive opioid consumption are more of a concern than in the setting of face-lift surgery, there appears to be a clear role for improving the postoperative experience in our patient population as well.

Despite the encouraging data, certain limitations in study design must be noted. This was a retrospective medical record review with no blinding or placebos. Beyond the temporal differences in medication administration, the lack of a significant variance in demographics or contaminant procedures between our 2 groups aided in minimizing confounding factors. Further studies may involve a prospective controlled design with larger numbers of participants if possible. An additional potential limitation is cost. Although actual prices vary significantly by geographic location and vendor, the cost of celecoxib can be considerable and is generally not covered by insurance carriers. This issue may need to be discussed with the patient prior to the procedure.

Table 3. Postoperative Pain Medication Use and Nausea/Vomiting in the 2 Study Groups

Characteristic	Noncelecoxib	Celecoxib	*P* Value
Pain medication used			
Oxycodone/acetaminophen doses,[a] mean (SD) No.	9.40 (4.30)	5.18 (4.58)	<.05
Acetaminophen doses,[a] mean (SD) No.	2.38 (2.66)	2.48 (3.52)	.87
Nausea/vomiting, No. (%)	12 (24)	0	NR

Abbreviation: NR, not reported.

[a] A dose of the combination oxycodone/acetaminophen drug was 5 mg/325 mg; a dose of acetaminophen only was 500 mg.

Table 4. Mean (SD) Sedation Scores[a] at Select Postoperative Measurement Times in the 2 Study Groups

Postoperative Time, h	Noncelecoxib	Celecoxib	*P* Value
6	1.52 (0.61)	1.64 (0.69)	.36
24	1.36 (0.53)	1.08 (0.27)	.001
48	1.10 (0.30)	1.00 (0.00)[b]	.02
Overall	1.33 (0.52)	1.24 (0.51)	.15

[a] A sedation score of 1 indicated fully aware; 2, awake but drowsy; 3, asleep but capable of following verbal orders; 4, asleep but responsive to tactile stimulus; and 5, drowsy and unresponsive to any stimulus.

[b] All participants in the celecoxib group recorded a sedation score of 1 by the 48-hour postoperative measurement.

Conclusions

Preemptive celecoxib is an effective agent in controlling postoperative pain and opioid consumption in patients undergoing face-lift, augmenting their level of comfort and reinforcing a positive experience. Considering the well-recognized adverse effects of opioids, celecoxib is an appealing alternative that has positively affected the practice of the senior author (D.B.R.).

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Study concept and design: Aynehchi, Rosenberg.
Acquisition, analysis, or interpretation of data: Aynehchi, Cerrati, Rosenberg.
Drafting of the manuscript: Aynehchi, Rosenberg.
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