



Ketorolac versus Ibuprofen: A Simple Cost-Efficacy Comparison for Dental Use

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As dentists, we are regularly inundated with promotional literature on the newest dental therapies and products. For the most part, this commercial marketing consists of large, four-color, glossy spreads, which typically summarize the efficacy of a product in one or two lines (i.e., the slogan), complemented by convincing graphs and photographs. These marketing methods can be impressive — the recent introduction of ketorolac (Toradol) is a case in point.

Ketorolac is being aggressively marketed to dentists as a “non-narcotic” analgesic that provides “narcotic efficacy without narcotic drawbacks.” At first glance, this promotional strategy gives the impression that until ketorolac came on the scene, there was no other “non-narcotic” alternative for the management of acute dental pain. This, however, is not the case.

Ibuprofen (e.g., Motrin, Advil, and Mediprin) is also a “non-narcotic” analgesic with proven “narcotic efficacy,” and it has been used for managing moderate to moderately severe dental pain for well over a decade. Ibuprofen is a NSAID (nonsteroidal anti-inflammatory drug) with both anti-inflammatory and analgesic properties.³ Many studies have confirmed its efficacy for relieving post dental surgery pain.¹⁻⁵

Ketorolac is also classified as an NSAID, but it is considered more

for its analgesic qualities than for its anti-inflammatory activity. Two studies investigating the efficacy of a single dose of ketorolac (10 mg) following dental impaction surgery have demonstrated it to be a superior analgesic to the acetaminophen and codeine combination analgesic Tylenol 3.^{6,7} The second study also included ibuprofen (400 mg) as one of the treatment groups. This second study revealed that the clinical efficacy of ketorolac (10 mg) versus ibuprofen (400 mg) was statistically insignificant.⁷

There is no doubt that ketorolac is an effective analgesic. However, for pain incurred during dental extraction, ketorolac and ibuprofen have been shown, scientifically, to be equally potent analgesics. The question that begs to be asked, then, is: are the two drugs available to the patient at a comparable cost?

Table 1 compares the costs of ketorolac (10 mg) with the costs of three available types of ibuprofen. The comparison is based on the cost to the patient of a typical post dental surgery prescription of 25 pills for each drug. The OTC (over-the-counter) form of ibuprofen is only available in 200 mg tablets. Therefore, a box of 50 pills is considered to be equivalent to 25 pills of 400 mg ibuprofen. Except for the cost of OTC ibuprofen, all other costs include the pharmacy's professional fees. As such, these costs will vary somewhat from city to city and province to province.

On a fractional cost comparison, Motrin (400 mg tablets) is 55 per cent less expensive than ketorolac. Even better value is found with generic ibuprofen (400 mg tablets) and OTC ibuprofen, with fractional costs of 41 per cent and 21 per cent respectively. Hence, the cost to the patient of a typical post dental surgery prescription of ibuprofen is one-half to one-fifth the cost of ketorolac.

For ketorolac to be cost-effective, its significantly higher cost would have to be concomitant with a proven analgesic advantage over ibuprofen. As discussed, a search of the scientific literature to date does not support the premise that ketorolac is superior to ibuprofen for dental use. Therefore, it seems reasonable to conclude that ketorolac is notably less cost effective than ibuprofen for the routine management of post dental extraction pain.

Ketorolac may well be a more potent analgesic than ibuprofen. However, even if this is the case, ketorolac's advantage is not realized when it is used to control post dental extraction pain. In other words, as painful as dental surgery may seem, it may not be painful enough to take advantage of ketorolac's superior analgesic properties, if these properties actually exist.

I do not wish to totally discount ketorolac's usefulness as a dental analgesic. On the contrary, the drug is a welcome addition to our



analgesic armamentarium. For instance, ketorolac is available for intramuscular injection, and is the only true alternative to narcotics via this route. A single intramuscular injection (i.M.) dose of ketorolac (30 mg) has been shown to be as effective as a 100 mg I.M. injection of meperidine (Demerol) for controlling post oral surgery pain.^{8,9}

On top of its I.M. advantage, ketorolac's oral tablet form could be used as a back-up in those few cases where patients do not respond to the normally prescribed analgesics. However, ketorolac, as well as other NSAIDs, including ibuprofen, should not be administered to patients presenting with a medical history of ASA allergy or serious gastrointestinal bleeding due to an underlying peptic ulcer disease.

Nevertheless, at this time it is simply not cost effective to routinely prescribe ketorolac (oral) for acute post dental surgery pain. This applies to all dental surgical procedures with the possible exception of dental impaction surgery, as the intensity of post surgical pain may be significantly higher in these cases. As such, more research is needed on ketorolac's efficacy, particularly with different oral dosage regimens, before it can be recommended for routine use in the management of dental pain.

Ketorolac is an example of how vigorous marketing can make a more costly, but not necessarily superior analgesic, look more attractive compared to what is already available. It is much easier to centre our attention on a visually pleasing product advertisement than on a dry scientific study. But as dentists, we have an obligation to our patients to evaluate the advantages of new therapies as they become available. In doing so, it is imperative that we base our judgements on the objective findings of properly performed scientific investigations rather than on subjective marketing or a clinician's perception. New dental therapies should also be judged on their cost effectiveness to the patient. Otherwise, it would be a disservice to our patients. ■

Table I

Cost Comparison of Ketorolac and Ibuprofen

Analgesic Type	Total Cost to Patient (\$)ª	Cost per Dose (\$/Tablet)ª	Fractional Costª
Ketorolac			
Toradol® 10 mg (25 tablets)	27.50	1.10	1.00
Ibuprofen			
Motrin® 400 mg (25 tablets)	15.00	0.60	0.55
Generic 400 mg (25 tablets)	11.25	0.45	0.41
OTC 200 mgª (50 pills)	6.00	0.24	0.21

a. Costs given by a Toronto area pharmacy. These costs include the pharmacy's professional fees. As such, these specific costs may vary from city to city and province to province.

b. Calculated by dividing the total cost to patient by 25 pills. The amount of pills dispensed affects this value.

c. Calculated by dividing the cost of each analgesic by the cost of ketorolac. The value represents the fractional cost of each analgesic to that of ketorolac.

d. Over-the-counter (OTC) ibuprofen is only available in 200 mg pills. Two pills of OTC are equivalent to one ibuprofen (400 mg) pill. A box of 50 OTC pills is equivalent to dispensing 25 ibuprofen (400 mg) pills.

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References

1. Cooper, S.A. Five studies on ibuprofen for postsurgical dental pain. *Am J Med* 77(1A):70-77, 1984.
2. Cooper, S.A. The relative efficacy of ibuprofen in dental pain. *Compend Contin Educ Dent* 7:579-597, 1986
3. Jain, A.K., Ryan, J.R., McMahon, F.G. et al. Analgesic efficacy of low-dose ibuprofen in dental extraction pain. *Pharmacotherapy* 6:318-322, 1986.
4. Forbes, J.A., Barkaszi, B.A., Ragland, R.N. et al. Analgesic effect of fendosal, ibuprofen and aspirin in postoperative oral surgery pain. *Pharmacotherapy* 4:385-391, 1984.
5. Mehlich, D.R., Sollectio, W.A., Helfrick, J.F. et al. Multicenter clinical trial of ibuprofen and acetaminophen in the treatment of postoperative dental pain. *JADA* 121:257-263, 1990.
6. Forbes, J.A., Butterworth, G.A., Buchfield, W.H. et al. Evaluation of ketorolac, aspirin and an acetaminophen-codeine combination in postoperative oral surgery pain. *Pharmacotherapy* 10:77S-93, 1990.
7. Forbes, J.A., Kehm, C.J., Gordin, C.D. et al. Evaluation of ketorolac, ibuprofen,

acetaminophen and acetaminophen-codeine combination in postoperative oral surgery pain. *Pharmacotherapy* 10:94S-105, 1990.

8. Brown, C.R. The analgesic efficacy of ketorolac tromethamine by oral and intramuscular administration in single-dose studies on various postoperative pain states. Paper delivered at the fifth World Congress on Pain. Hamburg, Germany, Aug. 4, 1987.

9. Brown, C.R., Moodie, J.E., Evans, S.A., et al. Efficacy of intramuscular (I.M.) ketorolac and meperidine in pain following major oral surgery. (abstr) *Clin Pharmacol Ther* 43:161, 1988.