Ketorolac Tromethamine

Brand names	Generic
Medication error potential	Look-alike, sound-alike drug names. Confusion has been reported between ketorolac and Ketalar and methadone, and Toradol was confused with Foradil.[1]
Contraindications and warnings	**U.S. boxed warning:** Ketorolac is indicated for the short-term (≤5 days, includes a combination of oral and IV) management of moderately severe acute pain that requires analgesia at the opioid level, usually in a postoperative setting. Patients should be switched to alternative analgesics as soon as possible, but ketorolac administration should not exceed 5 days. May increase the risk of serious GI toxicities including inflammation, ulceration, bleeding, and perforation of the stomach or intestines, which may be fatal. (See the Comments section.)[2] **Contraindications:** Contraindicated in patients with (1) previous hypersensitivity to ketorolac, aspirin, or other nonsteroidal anti-inflammatory drug (NSAID); (2) active peptic ulcer disease, recent GI bleeding/perforation, or history of peptic ulcer disease or GI bleeding; (3) advanced renal impairment and in patients with risk for renal impairment due to hypovolemia; (4) suspected/confirmed cerebrovascular bleeding, hemorrhagic diathesis, incomplete hemostasis, before any major surgery and intraoperatively, and others at high risk of bleeding; (5) undergoing coronary artery bypass graft surgery perioperatively; and (6) IT or epidural administration (alcohol content), labor and delivery, nursing mothers, concomitant probenecid, concomitant pentoxifylline, concomitant aspirin, or other NSAID use.
Infusion-related cautions	Anaphylactic reactions may occur in patients with a history of hypersensitivity to other NSAIDs, including aspirin, or in patients with nasal polyps, asthma, angioedema, or bronchospastic reactions of the histamine-dependent type.[23] (See the Comments section.)
Dosage	Ketorolac tromethamine is *not* indicated for use in pediatric patients and is *not* indicated for minor or chronic painful conditions. Hypovolemia should be corrected prior to the administration of ketorolac tromethamine. Therapy (parenteral and oral) should not exceed 5 days and the patient should be switched to an alternative analgesics as soon as possible. **Analgesia** **Neonates:** One study gave a single dose of 1 mg/kg to 18 neonates (mean age: 33 ± 4 weeks; range: 25–38 weeks) for postsurgical pain and pain due to procedures.[20] A retrospective study identified 11 neonates <30 days of age (none were premature) who had safely received ketorolac 0.5 mg/kg every 6 hours.[42] **Infants (>1 month but <2 years):** One study in patients <6 months of age (mean 1.1 ± 0.4 mg/kg/day; PCA 37–49 weeks) gave a maximum of 0.5 mg/kg q 8 hr (range 1–1.5 mg/kg/day) for 1–2 days following an abdominal surgical procedure.[22] Seventy infants and children [median age 10 months (range 2.5–174 months)], who underwent congenital heart surgery requiring cardiopulmonary bypass were randomized to receive ketorolac and an opioid (n = 35) or an opioid alone (n = 35). Ketorolac 0.5 mg/kg/dose (maximum 15 mg/kg/dose) q 6 hr was given for 36–48 hours.[41] **Children 2–16 years or those <50 kg:** For single-dose therapy the manufacturer recommends 0.5 mg/kg up to 15 mg IV or 1 mg/kg up to 30 mg IM.[2] Although the manufacturer's labeling limits therapy to ≤5 days,[2] early clinical experience with ketorolac in children reported the use of 0.17–1 mg/kg q 4–6 hr for an average of 3.4 days (range 1–12) and up to 31 doses.[21] **Children >16 years who are >50 kg:** 0.5 mg/kg q 6 hr[2] Doses of 0.5–1 mg/kg have been given to infants ≥1 month and children after induction of general anesthesia, at the beginning of a procedure, 30 minutes before the end of surgery/procedure, or immediately postoperative.[4-19] Some have advocated administration of a loading dose of 1 mg/kg.[3,21] **Antipyretic:** 0.5–1 mg/kg as a single dose[21,23]

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Dosage *(cont.)*	**Complex regional pain syndrome:** IV regional anesthesia using 0.5 mg/kg (and lidocaine) in an 11-year-old and a 15-year-old.[28] **Migraine headaches:** 0.5 mg/kg was inferior to prochlorperazine.[26] **Postoperative bladder spasms (after ureteral reimplantation):** 0.5 mg/kg q 6 hr for 48 hours reduced the frequency and severity of spasms.[24] One study reported using 0.5 mg/kg followed by 83.3 mcg/kg/hr in 26 children aged 1–5 years and found ketorolac was more effective in reducing frequency of bladder spasms and need for rescue analgesia compared to fentanyl.[25] **Sickle cell vaso-occlusive pain crisis:** 0.9 mg/kg did not reduce the total morphine dose required.[27] (See the Comments section.)
Dosage adjustment in organ dysfunction	Ketorolac is contraindicated in patients with advanced renal impairment and in those at risk for renal failure due to volume depletion.[2] If CrCl is 10–29 mL/min, give 50% of the usual dose, and if CrCl is <10 mL/min, give 25% to 50% of the usual dose.[29]
Maximum dosage	Increasing the dose of ketorolac beyond the label recommendations will not provide better efficacy but will increase the risk of developing serious adverse events.[2] A single dose of 30 mg (IM) or 15 mg (IV) in children.[2] A single loading dose of 60 mg was administered to a 16-year-old.[21] A single IV dose of 60 mg was administered preoperatively in patients undergoing single-stage adjustable strabismus surgery, which included patients >10 years of age; mean age 21.28 ± 14.04 years.[30] Total daily dose is 100 mg.[2]
Additives	None
Suitable diluents	D5NS, D5W, LR, R, NS[31]
Maximum concentration	30 mg/mL for IV infusion. 60 mg/2 mL is intended for *IM* use only.[2]
Preparation and delivery	*Parenteral products should be visually inspected for particulate matter and discoloration before use. Refer to appropriate references for more information on compatibility with other drugs and solutions; compatibility following Y-site delivery, and suggested storage and extended stability.*[31] **Stability:** Store at room temperature.[2] **Compatibility:** Incompatible in a syringe with morphine, meperidine, promethazine, and hydroxyzine[2,31] **Photosensitivity:** Protect from light[2] as prolonged exposure can cause discoloration and precipitation.[31]
IV push	Over ≥15 seconds[2] to over 1–5 minutes in children[21]
Intermittent infusion	Not indicated
Continuous infusion	May be given by continuous infusion (recommended 0.17 mg/kg/hr in children).[3]
Other routes of administration	IM via deep injection.[2] IV is the preferred route in children due to pain associated with IM administration.[3,21] Should *not* be given via intrathecal or epidural administration due to its alcohol content.