Enoxaparin (e-nox-a-par-in)

Classifications
- Therapeutic: anticoagulants
- Pharmacologic: antithrombotics, heparins (low molecular weight)

Indications
- Prevention of venous thromboembolism (VTE) (deep vein thrombosis (DVT) and/or pulmonary embolism (PE)) in surgical or medical patients.
- Treatment of DVT with or without PE (with warfarin).
- Prevention of ischemic complications (with aspirin) from unstable angina and non-ST-segment-elevation MI.
- Treatment of acute ST-segment-elevation MI (with thrombolytics or percutaneous coronary intervention).

Action
- Potentiates the inhibitory effect of antithrombin on factor Xa and thrombin.

Pharmacokinetics
- Absorption: 100% absorbed after subcut administration.
- Distribution: Unknown.
- Metabolism and Excretion: Metabolized in the liver, primarily renally eliminated. Clearance by 30% in renal impairment (CCr < 30 ml/min).
- Half-life: Single dose: 4.5 hr; Repeat dosing: 7 hr.

Contraindications/Precautions
- Contraindicated in: Hypersensitivity; Hypersensitivity to benzyl alcohol (multidose vial); Positive in vitro test for antiplatelet antibody in the presence of enoxaparin; Active, major bleeding.
- Use Cautiously in: Severe hepatic or renal disease; Recent surgery (CCr < 30 ml/min); Severe uncontrolled hypertension; Bacterial endocarditis; Bleeding disorders; GI bleeding/ulceration/pathology; Hemorrhagic stroke; Recent CNS or ophthalmologic surgery; History of thrombocytopenia related to heparin; Spinal/epidural anesthesia or spinal puncture; History of spinal/pedical anesthesia that may lead to long-term or permanent paralysis.

Adverse Reactions/Side Effects
- CNS: Dizziness, headache, insomnia.
- CV: Edema.
- GI: Constipation, liver enzymes, nausea, vomiting.
- GU: Urinary retention.
- Derm: Alopecia, ecchymoses, pruritus, rash, urticaria.
- F and E: Hyperkalemia.
- Hemat: Bleeding, anemia, eosinophilia, thrombocytopenia.
- Local: Erythema at injection site, hematoma, irritation, pain.
- MS: Osteoporosis.
- Misc: Fever.

Interactions
- Drug-Drug: Risk of bleeding may be increased by concurrent use of drugs that affect platelet function and coagulation, including warfarin, aspirin, thrombolytic agents, NSAIDs, dipyridamole, some penicillins, clopidogrel, abxsimad, epsilon-aminocaproic acid.

Route/Dosage
- VTE Prophylaxis
  - Subcut (Adults): Knee replacement surgery—30 mg q 12 hr starting 12–24 hr after surgery; Abdominal surgery—40 mg once daily starting 2 hr before surgery and then continued for 7–12 days or until ambulatory (up to 14 days).
  - Subcut (Infants and Children 2 mo — 18 yr): 0.5 mg/kg/dose every 12 hr.

Use Cautiously in:
- Recent major surgery or trauma; Major bleeding.
- Active, major bleeding.
- Severe hepatic or renal disease (administer if CCr < 30 ml/min).
- Recent surgery (CCr < 30 ml/min).
- Uncontrolled hypertension;
- Recent surgery (CCr < 30 ml/min).

Cautions
- Pregnancy Category B.
- Women > 45 kg and men > 57 kg (exposure to enoxaparin with a risk of bleeding; weight-adjusted dosing recommended).
- Use only if bleeding cannot be managed by treatment with warfarin.

Exercise Extreme Cautions in:
- Severe uncontrolled hypertension;
- Bacterial endocarditis;
- Bleeding disorders;
- GI bleeding/ulceration/pathology;
- Hemorrhagic stroke;
- Recent CNS or ophthalmologic surgery;
- History of thrombocytopenia related to heparin; Spinal/epidural anesthesia or spinal puncture; History of spinal/pedical anesthesia that may lead to long-term or permanent paralysis.

Drug Interactions
- Risk of bleeding may be increased by concurrent use of drugs that affect platelet function and coagulation, including warfarin, aspirin, thrombolytic agents, NSAIDs, dipyridamole, some penicillins, clopidogrel, abxsimad, epsilon-aminocaproic acid.

Dose:
- Enoxaparin (e-nox-a-par-in)
- Therapeutic: anticoagulants
- Pharmacologic: antithrombotics, heparins (low molecular weight)
- Pregnancy Category B
- Indications:
  - Prevention of venous thromboembolism (VTE) (deep vein thrombosis (DVT) and/or pulmonary embolism (PE)) in surgical or medical patients.
  - Treatment of DVT with or without PE (with warfarin).
  - Prevention of ischemic complications (with aspirin) from unstable angina and non-ST-segment-elevation MI.
  - Treatment of acute ST-segment-elevation MI (with thrombolytics or percutaneous coronary intervention).
- Action:
  - Potentiates the inhibitory effect of antithrombin on factor Xa and thrombin.
- Pharmacokinetics:
  - Absorption: 100% absorbed after subcut administration.
  - Distribution: Unknown.
  - Metabolism and Excretion: Metabolized in the liver, primarily renally eliminated. Clearance by 30% in renal impairment (CCr < 30 ml/min).
  - Half-life: Single dose: 4.5 hr; Repeat dosing: 7 hr.
- Contraindications/Precautions:
  - Contraindicated in: Hypersensitivity; Hypersensitivity to benzyl alcohol (multidose vial); Positive in vitro test for antiplatelet antibody in the presence of enoxaparin; Active, major bleeding.
  - Use Cautiously in: Severe hepatic or renal disease (adjust dose if CCr < 30 ml/min); Retinopathy (hypertensive or diabetic); Uncontrolled hypertension; Recent history of ulcer disease; History of congenital or acquired bleeding disorder; Women > 45 kg and men > 57 kg (exposure to enoxaparin with a risk of bleeding; weight-adjusted dosing recommended).
- Adverse Reactions/Side Effects:
  - CNS: Dizziness, headache, insomnia.
  - CV: Edema.
  - GI: Constipation, liver enzymes, nausea, vomiting.
  - GU: Urinary retention.
  - Derm: Alopecia, ecchymoses, pruritus, rash, urticaria.
  - F and E: Hyperkalemia.
  - Hemat: Bleeding, anemia, eosinophilia, thrombocytopenia.
  - Local: Erythema at injection site, hematoma, irritation, pain.
  - MS: Osteoporosis.
  - Misc: Fever.
- Interactions:
  - Drug-Drug: Risk of bleeding may be increased by concurrent use of drugs that affect platelet function and coagulation, including warfarin, aspirin, thrombolytic agents, NSAIDs, dipyridamole, some penicillins, clopidogrel, abxsimad, epsilon-aminocaproic acid.
- Route/Dosage:
  - VTE Prophylaxis:
    - Subcut (Adults): Knee replacement surgery—30 mg q 12 hr starting 12–24 hr after surgery; Abdominal surgery—40 mg once daily starting 2 hr before surgery and then continued for 7–12 days or until ambulatory (up to 14 days);
    - Subcut (Infants and Children 2 mo — 18 yr): 0.5 mg/kg/dose every 12 hr.
  - Subcut (Infants 1–2 mo): 0.75 mg/kg/dose every 12 hr.
Treatment of DVT/PE
Subcut (Adults): Outpatient—1 mg/kg every 12 hr. Warfarin should be started within 72 hr; enoxaparin may be continued for a minimum of 5 days and until therapeutic anticoagulation with warfarin is achieved (INR 2 for 2 consecutive days). Inpatient—1 mg/kg every 12 hr or 1.5 mg/kg every 24 hr. Warfarin should be started within 72 hr; enoxaparin may be continued for a minimum of 5 days or until therapeutic anticoagulation with warfarin is achieved (INR 2 for 2 consecutive days).
Subcut (Infants and Children ≥2 mo — 18 yr): 1 mg/kg/dose every 12 hr.
Subcut (Infants 1–2 mo): 1.5 mg/kg/dose every 12 hr.

Unstable Angina/Non–ST-Segment-Elevation MI
Subcut (Adults): 1 mg/kg q 12 hr for 2–8 days (with aspirin).
ST-Segment-Elevation MI
IV, Subcut (Adults ≥75 yr): Administer single IV bolus of 30 mg plus 1 mg/kg subcut dose (maximum of 100 mg for first 2 doses only), followed by 1 mg/kg subcut q 12 hr. The usual duration of treatment is 2–8 days. In patients undergoing percutaneous coronary intervention, if last subcut dose was <6 hr before balloon inflation, no additional dosing needed; if last subcut dose was >6 hr before balloon inflation, administer single IV bolus of 1.5 mg/kg.
Subcut (Adults <25 yr) or 7.5 mg/kg every 12 hr (no IV bolus needed). The usual duration of treatment is 2–8 days.

Renal Impairment
Subcut (Adults CCr ≥30 mL/min): VTE prophylaxis for abdominal or knee/hip replacement surgery—30 mg once daily. Treatment of DVT/PE—1 mg/kg once daily. Unstable angina/non–ST-segment-elevation MI—1 mg/kg once daily. ST-segment-elevation MI (patients >75 yr)—Single IV bolus of 30 mg plus 1 mg/kg subcut dose, followed by 1.5 mg/kg subcut q 12 hr. Acute ST-segment-elevation MI (patients >75 yr)—1 mg/kg once daily (no initial bolus).

NURSING IMPLICATIONS
Assessment
● Assess for signs of bleeding and hemmorhage (bleeding gums; nosebleed; unusual bruising; black, tarry stools; hematuria; fall in hematocrit or BP; gastric-positive stools; bleeding from surgical site). Notify health care professional if these occur.
● Assess patient for evidence of additional or increased thrombosis. Symptoms depend on area of involvement.
● Assess location, duration, intensity, and precipitating factors of anginal pain.
● Monitor patient for hypersensitivity reactions (chills, fever, urticaria). Report signs to health care professional.
● Monitor patients with epidural catheters frequently for signs and symptoms of neurologic impairment. Delay placement or removal of catheter for at least 12 hours after administration of lower doses (30 mg once or twice daily or 40 mg once daily) and at least 24 hours after administration of higher doses (50–75 mg once daily). 1 mg/kg twice daily, or 3 mg/kg once daily) of enoxaparin. Monitor for signs and symptoms of neurologic impairment (numbness back pain, numbness and motor deficits [numbness or weakness in lower limbs], bowel and/or bladder dysfunction) frequently if epidural or spinal anesthesia or lumbar puncture is done during therapy.
● Subcut: Observe injection site for hematomas, ecchymosis, or inflammation.
● Lab Test Considerations: Monitor CBC, platelet count, and stools for occult blood periodically during therapy. If thrombocytopenia occurs, monitor closely. If thrombocytopenia develops unexpectedly, reassess patient for potential bleeding sites.
● Special monitoring of clotting times (aPTT) is not necessary in most patients. Monitoring of the aPTT may be considered in certain patient populations (such as obese patients or patients with renal insufficiency).
● Monitoring of Antifactor Xa levels may be necessary to titrate doses in pediatric patients. Therapeutic range 0.5–1 unit/mL. Maintenance doses may be necessary to titrate doses in pediatric patients. Therapeutic range 0.5–1 unit/mL.
● Monitor for hypokalemia.
● Monitor for hypotension.
● Monitor for cardiovascular complications.

Potential Nursing Diagnoses
Ineffective tissue perfusion (Indications)
Risk for injury (Side Effects)

Implementation
● Do not confuse Lovenox with Levemir.
● Cannot be used interchangeably (unit for unit) with unfractionated heparin or other low-molecular-weight heparins.

© 2015 F.A. Davis Company
**CONTINUED**

**enoxaparin**

- **Subcut:** Administer deep into subcut tissue. Alternate injection sites daily between the left and right anterolateral and left and right posterolateral abdominal wall. Inject entire length of needle at a 45° or 90° angle into a skin fold held between thumb and forefinger; hold skin fold throughout injection. Do not aspirate or massage. Rotate sites frequently; do not administer IM because of danger of hematoma formation. Solutions should be clear, colorless to pale yellow; do not inject solution containing particulate matter.

  - If excessive bruising occurs, use colder massage of site before injection may lessen bruising.
  - To avoid the loss of drug, do not expel the air bubble from prefilled syringes before the injection. Use a tuberculin syringe when using multidose vials to ensure correct dose.
  - To minimize risk of bleeding after vascular instrumentation for unstable angina, recommended intervals between doses should be followed closely. Leave vascular access sheath in place for 6–8 hr after enoxaparin dose. Give next enoxaparin dose 6–8 hr after sheath removal. Observe site for bleeding or hematoma formation.

**IV Administration**

- **Direct IV** (for treatment of STEMI only) Use multiple-dose vial. Inject via IV line. Flush with 0.9% NaCl or D5W prior to and following administration to avoid mixture with other drugs and clear the port of the drug. May be administered with 0.9% NaCl or D5W. Rate: Inject as a bolus.

  - **Y-Site Incompatibility:** Do not mix or co-administer with other medications.

**Patient/Family Teaching**

- Advise patient to report any symptoms of unusual bleeding or bruising, dizziness, itching, rash, fever, swelling, or difficulty breathing to health care professional immediately.

  - Advise patient not to take aspirin, ibuprofen, or ibuprofen without consulting health care professional while on enoxaparin therapy.

**Evaluation/Desired Outcomes**

- Prevention of deep vein thrombosis and pulmonary embolism.

  - Resolution of acute deep vein thrombosis.

  - Prevention of ischemic complications (with aspirin) in patients with unstable angina (or non-Q-wave MI).

  - Treatment of acute ST-segment elevation myocardial infarction.

**Why was this drug prescribed for your patient?**