mannitol (man-i-tol)
Osmitrol, Resectisol

Classification
Therapeutic: diuretics
Pharmacologic: osmotic diuretics

Pregnancy Category C

Indications
IV: Adjunct in the treatment of: Acute oliguric renal failure, Edema, Increased intra- cerebral or intracranial pressure. Toxic overdose. GI: Irrigant (during transurethral procedures 2.5–5% solution only)

Action
Increases the osmotic pressure of the glomerular filtrate, thereby inhibiting reabsorption of water and electrolytes. Causes excretion of: Water, Sodium, Potassium, Chloride, Calcium, Phosphorus, Magnesium, Urea, Uric acid.

Therapeutic Effects:
Mobilization of excess fluid in oliguric renal failure or edema. Reduction of intraocular or intracranial pressure. Increased urinary excretion of toxic materials. Decreased hemolysis when used as an irrigant after transurethral prostatic resection.

Pharmacokinetics
Absorption: IV administration produces complete bioavailability. Some absorption may follow use as a GI irrigant.
Distribution: Confined to the extracellular space; does not usually cross the blood-brain barrier or eye.
Metabolism and Excretion: Excreted by the kidneys; minimal liver metabolism.
Half-life: 100 min.

TIME/ACTION PROFILE (diuretic effect)
ROUTE ONSET PEAK DURATION
IV 30–60min 1hr 6–8hr

Contraindications/Precautions
Contraindicated in: Hypersensitivity; Anuria; Dehydration; Active intracranial bleeding; Severe pulmonary edema or congestion.
Use Cautiously in: OB, Lactation, Safety not established.

Adverse Reactions/Side Effects
CNS: confusion, headache.
EENT: blurred vision, rhinitis.
CV: transient volume expansion, chest pain, HF, pulmonary edema, hypokalemia, hypernatremia, hyponatremia, arrhythmias, tachycardia, phlebitis at IV site.
GI: nausea, thirst, vomiting.
GU: renal failure, urinary retention.
F and E: dehydration, hypokalemia, hypernatremia, hyponatremia.
Local: phlebitis at IV site.

Interactions
Drug-Drug: Hypokalemia ↑ the risk of digoxin toxicity.

Route/Dosage
IV (Adults):
Edema, oliguric renal failure—50–100 g as a 5–25% solution, may precede with a test dose of 0.2 g/kg over 3–5 min. Reduction of intracranial/intraocular pressure—0.35–0.59 g/kg as 5–25% solution over 30–60 min (500 mg/kg may be sufficient in small or debilitated patients). Diminished in drug intoxications—50–200 g as a 5–25% solution titrated to maintain urine flow of 100–300 mL/hr.

IV (Children):
Initial—0.5–1 g/kg as a 15–20% solution; may precede with a test dose of 0.2 g/kg over 3–5 min. Maintenance—0.25–0.5 g/kg q 4–6 hrs; a 15–20% solution over 30–60 min (500 mg/kg may be sufficient in children or debilitated patients). Diminished in drug intoxications—upto 2 g/kg (500 mg/mL) as a 5–10% solution.

IV (Neonates):
Acute renal failure—0.5–1 g/kg/hr.

NURSING IMPLICATIONS
Assessment
• Monitor vital signs, urine output, CVP, and pulmonary artery pressures (PAP) before and hourly throughout administration. Assess patient for signs and symptoms of dehydration (decreased skin turgor, fever, dry skin and mucous membranes, short or signs of fluid overload (increased CVP, dyspnea, rales/crackles, edema).
• Assess patient for: anorexia, muscle weakness, numbness, tingling, paresthesia, confusion, and excessive thirst. Report signs of electrolyte imbalance.

Potential Nursing Diagnoses
• Fluid Volume Deficit (Indications)

Implementation
• Use a new container and a new needle for each patient. Use aseptic technique with injection site.
• Dilute concentrated solution with normal saline to desired concentration.
• Administer IV over 30–60 min; may be given as a bolus.
• IV: Incompatibility—pH, Mixes;

Evaluation
• Therapeutic: Mobilization of excess fluid in oliguric renal failure or edema. Reduction of intraocular or intracranial pressure. Increased urinary excretion of toxic materials. Decreased hemolysis when used as an irrigant after transurethral prostatic resection.
● Increased Intracranial Pressure: Monitor neurologic status and intracranial pressure readings in patients receiving this medication to decrease cerebral edema.

● Increased Intraocular Pressure: Monitor for persistent or increased eye pain or decreased visual acuity.

Lab Test Considerations: Renal function and serum electrolytes should be monitored routinely throughout course of therapy.

Potential Nursing Diagnoses

Increased fluid volume (Indications)

Risk for altered fluid volume (Side Effects)

Implementation

● Observe infusion site frequently for infiltration. Extravasation may cause tissue irritation and necrosis.

Do not administer electrolyte-free mannitol solution with blood. If blood must be administered simultaneously with mannitol, add at least 20 mEq NaCl to each liter of mannitol.

● Consult with physician regarding placement of an indwelling Foley catheter (except when used to decrease intracranial pressure).

IV: Administer by IV infusion unfiltered. If solution contains crystals, warm bottle in hot water and shake vigorously. Do not administer solution in which crystals remain undissolved. Cool to body temperature. Use an in-line filter for 15%, 20%, and 25% infusions.

● Test Dose: Administer over 5–10 min to produce a urine output of 30–50 mL/hr. If urine flow does not increase, administer 2nd test dose. If urine output is not at least 30–50 mL/hr for 1 hr after 2nd test dose, patient should be re-evaluated.

● Oliguria: Administration rate should be titrated to produce a urine output of 30–50 mL/hr. Administer child’s dose over 2–6 hr.

● Increased Intracranial Pressure: Infuse dose over 30–60 min in adults and children.

Intraocular Pressure: Administer dose over 30 min. When used preoperatively, administer 30–60 min before surgery.

Y-Site Compatibility: amifostine, aztreonam, fludarabine, fluorouracil, idarubicin, linezolid, melphalan, ondansetron, paclitaxel, piperacillin/tazobactam, sargramostim, tocainide, thiotepa, vinorelbine.

Y-Site Incompatibility: cefepime, filgrastim.

Irrigation: Add contents of two 50-mL vials of 25% mannitol to 900 mL of sterile water for injection for a 2.5% solution for irrigation. Use only clear solutions.

Evaluation/Desired Outcomes

● Urine output of at least 30–50 mL/hr or an increase in urine output in accordance with parameters set by physician.

● Reduction in intracranial pressure.

● Reduction of intraocular pressure.

● Excretion of certain toxic substances.

● Irrigation during transurethral prostate resection.

Why was this drug prescribed for your patient?