Enoxaparin

Enoxaparin is a polysaccharide chain produced by the depolymerization of heparin. In comparison with heparin, which has an average molecular weight of 12,000-15,000 daltons, the average molecular weight of enoxaparin is approximately 4500 daltons.

Enoxaparin is a low-molecular weight heparin marketed under the trade names Lovenox, Xaparin and Clexane, among others.

Enoxaparin is manufactured by Sanofi and is derived from the intestinal mucosa of pigs. Generic versions are available from Amphastar Pharmaceuticals and Sandoz.

Indications

It is an anticoagulant used to prevent and treat deep vein thrombosis or pulmonary embolism, and is given as a subcutaneous injection (by a health care provider or the patient). Its use is evolving in acute coronary syndromes (ACS).

Early pharmacological deep vein thrombosis (DVT) prophylaxis is recommended by guidelines, but rarely started within 48 hours.

Enoxaparin is safe and effective in reducing cerebral vasospasm and ischemia following SAH (Hunt Hess grades I-III), resulting in a better long-term outcome for the patient [1)].

Mirroring Enoxaparin (ENX), HMGB1 signaling blockade reduces LEU recruitment, cerebrovascular permeability, and brain edema following TBI. ENX further reduced lung edema indicating a multifaceted effect beyond HMGB1 blockade. Further study is needed to determine how ENX may play a role in blunting HMGB1 signaling in brain injury patients [2)].

Case series

Ianosi et al. from the Institute of Medical Informatics, UMIT - University for Health Sciences, Medical Informatics and Technology, Hall, Department of Neurology, Neurological Intensive Care Unit, Medical University of Innsbruck, Department of Clinical and Experimental Medicine, University of Sassari, Italy, Department of Neuroradiology, Medical University of Innsbruck, Department of Neurosurgery, Medical University of Innsbruck, Austria, analyzed 134 consecutive patients admitted to a tertiary neurointensive care unit with diagnosed spontaneous intracerebral hemorrhage, obtained informed consent and without previous anticoagulation, a severe coagulopathy, hematoma evacuation, early withdrawal of therapy or ineligibility for DVT prophylaxis according to there institutional protocol. Significant late hematoma expansion (HE) was defined as ≥6mL increase of hematoma volume between neuroimaging within 48h and day 3-6. Multivariate analysis was performed to identify risk factors for late HE, poor 3-month outcome (mRS≥4) and mortality.

Patients had a median Glasgow Coma Scale Score of 14 (IQR 10-15), ICH volume of 11mL (IQR 5-24)

and were 71 years old (IQR 61-76). 56% (N=76) received early DVT prophylaxis, 37% (N=50) late DVT prophylaxis and 8 (6%) had unknown bleeding onset. Patients with early DVT prophylaxis had smaller ICH volume (9.5mL, IQR 4-18.5; versus 17.5mL, IQR 8-29; p=0.038) and more often were comatose (26% versus 10%, p=0.025). Significant late HE (N=5/134, 3.7%) was associated with larger initial ICH volume (p=0.02) and lower thrombocyte count (p=0.03) but not with early DVT prophylaxis (p=0.36). Early DVT prophylaxis was not associated with worse outcome.

Significant late HE is uncommon and DVT prophylaxis within 48h of symptom onset may be safe in selected ICH patients [3].

1)
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2)
Li S, Eisenstadt R, Kumasaka K, Johnson VE, Marks J, Nagata K, Browne KD, Smith DH, Pascual JL. Does enoxaparin interfere with HMGB1 signaling after TBI? A potential mechanism for reduced cerebral edema and neurologic recovery. J Trauma Acute Care Surg. 2016 Mar;80(3):381-7; discussion 387-9. doi: 10.1097/TA.0000000000000935. PubMed PMID: 26670109.
3)
Ianosi B, Gaasch M, Rass V, Huber L, Hackl W, Kofler M, Schiefecker AJ, Addis A, Beer R, Rhomberg P, Pfausler B, Thomé C, Ammenwerth E, Helbok R. Early thrombosis prophylaxis with enoxaparin is not associated with hematoma expansion in patients with spontaneous intracerebral hemorrhage. Eur J Neurol. 2018 Oct 11. doi: 10.1111/ene.13830. [Epub ahead of print] PubMed PMID: 30308696.