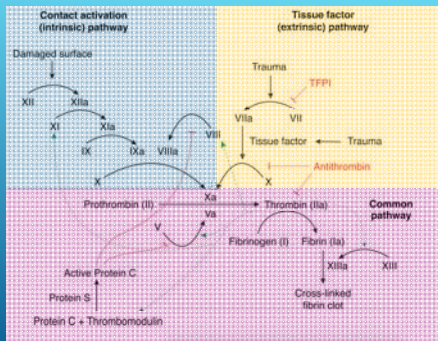


GENERAL OVERVIEW OF BLEEDING MANAGEMENT

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GENERAL OVERVIEW – COAGULATION CASCADE



GENERAL OVERVIEW

- ▶ Rapid control of compressible hemorrhage should be initiated with direct pressure or hemostatic dressings
- ▶ Tourniquets if necessary
- ▶ Identification and surgical control of non-compressible bleeding
- ▶ Resuscitation – Crystalloid and colloid solutions should be minimized in stable patients
- ▶ Early delivery of plasma and platelet transfusion in fixed ratios to red blood cells approaching 1:1:1
- ▶ Low dose vasopressin

TRANEXAMIC ACID (TXA)

- ▶ Antifibrinolysis: Reduce clot breakdown
- ▶ FDA approved for uterine bleeding and hemophilia
- ▶ 50 studies in elective surgery showed 33% reduction in transfusion requirements but no change in mortality
- ▶ Potential thrombosis, DVT/PE
- ▶ BJM 2014: 872,416 patients who had total knees or hip arthroplasty. No increase in complications
- ▶ Can be used topically



TRANEXAMIC ACID (TXA)

- ▶ In cardiac surgery, e.g. coronary artery bypass surgery, it is used to prevent excessive blood loss.
- ▶ In spine surgery, e.g. scoliosis correction with posterior spinal fusion using instrumentation, to prevent excessive blood loss
- ▶ In hyphema - Tranexamic acid has been shown to be effective in reducing risk of secondary hemorrhage outcomes in patients with traumatic hyphema

TRANEXAMIC ACID (TXA)

- ▶ Trauma studies showed statistically significant reduction of mortality in bleeding trauma patients.
- ▶ US Military using TXA as first line treatment
- ▶ Cost Effective
- ▶ Dosing – 1 gm IV slow injection followed by 1gm IV over next 8 hours
- ▶ Common side effects include:
 - ▶ Headaches (50.4 - 60.4%)
 - ▶ Back aches (20.7 - 31.4%)
 - ▶ Nasal sinus problem (25.4%)
 - ▶ Abdominal pain (12 - 19.8%)
 - ▶ Diarrhea (12.2%)
 - ▶ Fatigue (5.2%)
 - ▶ Anemia (5.6%)

HEMOSTATIC GAUZE

- ▶ Inorganic - Hydrous Aluminum Silicate Clay
- ▶ Kaolin (Quikclot)
- ▶ Smectite (Woundstat)



HEMOSTATIC GAUZE

- ▶ Organic
 - ▶ Chitosan (Celox, ChitoGauze, mRDH)
 - ▶ Microfibrillar Collagen (Avatene)
 - ▶ Cellulose - Platelet aggregation
 - ▶ Gelatins - Intrinsic pathway
 - ▶ Fibrin Sealant



COMBAT GAUZE

- ▶ Z-Medica
- ▶ Kaolin & Smectite impregnated gauze
- ▶ 3" x 4 Yards
- ▶ Activates Factor XII
- ▶ Platelet aggregation
- ▶ No contraindications
- ▶ Used by US Military
- ▶ \$23.50



WOUNDSTAT

- ▶ Trauma Cure, Inc.
- ▶ Smectite granules
- ▶ Activates Factor XII
- ▶ Platelet aggregation
- ▶ Emboli & Intravascular thrombosis
- ▶ No longer used by US Military
- ▶ \$23.50



CELOX

- ▶ Medtrade Products, Ltd
- ▶ Chitosan derived from shrimp and crustacean shells
- ▶ 3" x 5 Ft gauze
- ▶ Contraindicated in patients with shellfish allergy
- ▶ \$26.00
- ▶ Antibacterial properties
- ▶ Independent of intrinsic pathway



CHITOGAUZE

- ▶ HemCon, Inc.
- ▶ Chitosan derived from shrimp & other crustacean shells
- ▶ Contraindicated in patients with shellfish allergies
- ▶ \$50.00
- ▶ Antibacterial properties
- ▶ Independent of intrinsic pathway



MODIFIED RAPID DEPLOYMENT HEMOSTATIS(mrdh)

- ▶ Marine Polymer Technologies, Inc
- ▶ Poly-N-acetyl glucosamine
- ▶ Marine microalgae
- ▶ Platelet activation
- ▶ Thrombin generation
- ▶ Vasoconstriction
- ▶ \$700
- ▶ Only product studied in hospital setting



AVITENE ULTRAFORM SPONGE

- ▶ Bard
- ▶ Microfibrillar collagen
- ▶ Bovine collagen
- ▶ Intrinsic pathway
- ▶ Fibrin formation
- ▶ Contraindicated with pork allergy



SURGICEL

- ▶ Ethicon
- ▶ Oxidized cellulose polymer
- ▶ Polyanhydroglucuronic acid
- ▶ Bacteriocidal
- ▶ Platelet aggregation
- ▶ Intrinsic pathway
- ▶ Neurotoxic



GELFOAM

- ▶ Pfizer
- ▶ Purified pork skin gelatin
- ▶ Intrinsic pathway
- ▶ With or without thrombin

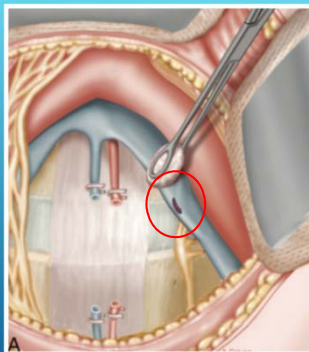


EVARREST FIBRIN SEALANT PATCH

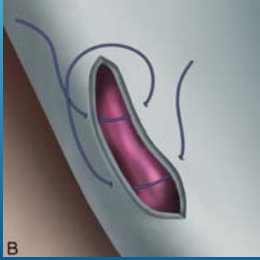
- ▶ Ethicon
- ▶ Oxidized cellulose
- ▶ Vicryl
- ▶ Human Thrombin & Fibrinogen
- ▶ Common pathway
- ▶ Can cause hypersensitivity reactions
- ▶ Fully bioabsorbable



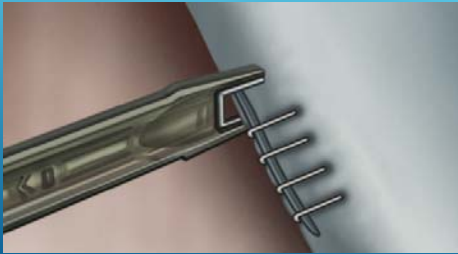
COMMON ILIAC VEIN INJURY



SUTURE REPAIR – 5/0 PROLENE C1 NEEDLE



RAILROAD STAPLING REPAIR



LIGATION

- ▶ You can ligate any vein – including the Vena Cava
- ▶ Arteries you can ligate:
 - ▶ Common Carotid
 - ▶ External Carotid
 - ▶ Common Iliac
 - ▶ Internal Iliac
- ▶ DO NOT ligate:
 - ▶ Internal Carotid
 - ▶ External Iliac
