ANZ SURGICAL HAEMOSTASIS, SEALING & ADHESION PREVENTION WORKSHOP

LEARNING OUTCOMES & MEASURES

NEEDS ASSESSMENT:

- Diversity & range of topical haemostatic & sealing agents, both in use & emerging, requires ongoing surgeon awareness of product composition, classifications, & modes of action.
- Understanding & practice is needed both to support clinical decision-making in product selection for the range of bleeding scenarios encountered intraoperatively & to optimise application techniques.

DESCRIPTION: Full day workshop

- Didactic:
    - Instructing surgeons' eg: clinical scenarios, personal experiences, difficult cases, treatment options etc.
    - Industry: product overview incl: categorisation, modes of action, technical & safety data; plus review Validated Intraoperative Bleeding (VIBe) scale & relationship to haemostatic agent selection.
- Surgical lab:
    - non-recovery live animal surgery – under senior clinician guidance participants manage a range of bleeding scenarios using topical haemostatic, sealing agents, +/- adhesion reduction agents.

LEARNING OUTCOMES:

- Identify surgical topical haemostatic agent categories & state how different groups may impact intra & post-operative efficacy.
- Demonstrate clinical decision-making skills in product selection in relation to bleeding grade, tissue, type & location.
- Relate patient factors that may impact bleeding risks & influence choice of topical agent category
- Demonstrate optimised techniques in topical agent application to maximise efficacy & outcomes
- Identify technical aspects, compositions, & modes of action of adjunctive agents used intraoperatively
- Classify bleeding grades according to VIBe scale *(+/- supplemental online review)*

EVALUATION:

- Instructor assessment: participant product selection criteria & rationale during live animal surgery
- Instructor assessment: participant application techniques during live animal surgery
- Participant: review & grading of surgical bleeding models videos, per VIBe scale
- Participant: self-assessed feedback re: personal outcomes & impact on practice

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PRODUCTS: BIOSURGICAL AGENTS:

- *List includes agents that may not be available in local market.*
- *Only locally approved products to be used.*

FLOSEAL Haemostatic matrix: (variants)

- Flowable: human (or recombinant) thrombin / bovine gelatine haemostatic matrix:
- adjunct to haemostasis in control of bleeding, ranging from oozing to spurting

TISSEEL VH S/D fibrin sealant:

- fibrin sealant: thrombin / fibrinogen:
- adjunct to surgical haemostasis.
- Sealing
- mesh fixation hernia repair as alternative to sutures, staples or tacks

HEMOPATCH: sealing haemostat:

- advanced patch: NHS-PEG coated bovine collagen pad.
- sodium bicarbonate (4.2% - 8.4%) may be used in conjunction.
- haemostatic device & surgical sealant - control of bleeding / leakage of other body fluids by conventional surgical techniques ineffective or impractical.

TACHOSIL absorbable patch:

- advanced patch: equine collagen pad coated w. fibrinogen / thrombin.
- adjunct to haemostasis during surgery

RECOTHROM

- thrombin alfa (recombinant) lyophilised powder & sterile diluent
- aid haemostasis, oozing blood & minor bleeding from capillaries/small venules.
- May be used in conjunction with compatible absorbable gelatine sponge

PERCLOT Haemostatic system:

- Haemostatic powder: absorbable modified polymer (AMP®) particles. Biocompatible, non-pyrogenic, purified plant starch.
- surgical procedures (except neurological & ophthalmic) or injuries as adjunct haemostasis for control of bleeding from capillary, venous, or arteriolar vessels.

HEMOBLAST

- haemostatic powder: porcine collagen, bovine chondroitin sulphate, human thrombin
- adjunct to haemostasis in control of minimal, mild, and moderate bleeding

OSTENE bone haemostasis material

- malleable stick: water-soluble alkylene oxide copolymers.
- Surgical implant material for control of bleeding from bone surfaces - mechanical barrier.

CELSTAT oxidized cellulose:

- Sheet: Oxidised non-regenerated cellulose: knit, fibrillar & non-woven presentations.
- capillary, venous, small arterial bleeding as well as prevention of bleeding in early post-operative stage

COSEAL synthetic hydrogel:

- hydrogel: Polyethylene glycol (PEG) hydrogel
- sealing suture lines along arterial and venous reconstructions
- enforcement of suture/staple lines in lung resection procedures
- reduce incidence severity & extent of post-surgical adhesion formation in cardiac &/or laparotomy or laparoscopic gynaecological surgery

ADEPT adhesion reduction solution:

- solution: 4% w/v icodextrin in an electrolyte solution
- Intraperitoneal irrigation & instillate for reduction of adhesions in laparoscopic gynaecological surgery

SEPRAFILM Adhesion Barrier

- sheet: chemically modified anionic polysaccharides, sodium hyaluronate (HA) & carboxymethylcellulose (CMC).
- sterile, bioresorbable, translucent membrane
- Abdominal & pelvic surgery for reducing incidence, extent & severity of postoperative adhesions, & reduce adhesive small bowel obstruction.

ARTISS fibrin sealant:

- fibrin sealant: fibrinogen / human thrombin (4IU /mL)
- Adhere autologous skin grafts in burns surgery; adhere tissue flaps (rhytidectomy)

PERISTRIPS DRY with VERITAS (PSDV)

- Buttress: collagen matrix- bovine pericardium prosthesis
- staple line reinforcement; surgical repair of soft tissue deficiencies using surgical staplers.
- reinforcement of staple lines during bariatric, gastric, small bowel, mesentery, colon, & colorectal surgical procedures

PERI-GUARD / SUPPLE PERIGUARD:

- graft: Bovine pericardium cross linked w. glutaraldehyde
- Pericardial closure & soft tissue deficiencies incl: abdominal & thoracic wall, hernias, & intracardiac & great vessel repair

VASCU-GUARD:

- graft: Bovine pericardium cross linked w. glutaraldehyde
- Peripheral vascular reconstruction, incl: carotid, renal, iliac, femoral, profunda and tibial blood vessels.

ACTIFUSE:

- Bone Graft Substitute: 0.8% silicate substituted calcium phosphate bone graft substitute. Bone void filler intended only for orthopaedic applications as filler for gaps / voids not intrinsic to stability of the bone structure

PROCEDURES - *Overall duration - max: 4 hrs*

- *surgical interventions commence once animal fully anaesthetized.*
- *procedures optional - undertaken at instructor discretion*
- *procedures performed in a least to most invasive order*
- *procedures may be repeated per animal physiological status*
- *animal not recovered between procedures & humanely euthanized without recovery at conclusion.*
- *product selection: participant discretion – application guidance: HCP instructor / Baxter specialist*
- *more than one agent may be used for any single surgical model.*

ABDOMINOPELVIC:

- *Position: supine - midline laparotomy with cautery - xyphoid to navel*
- *Kidneys may be exteriorized via midline laparotomy or dorsal flank laparotomy*

Hernia Mesh fixation

- rectus abdominis muscle (≤ 12x12cm plane) exposed using blunt dissection to prepare application site for onlay and/or underlay mesh placement (proxy - loose weave gauze).
- and/or oblique incision groin area. Tissues dissected till inguinal ligament, close as possible to peritoneum to be in pre-peritoneal space (≤ 12x12cm); position mesh (≤ 6x6cm) on femoral side
- mesh may be applied before or after performing bleeding exercises in abdominal cavity

Organ Abrasion

- Spleen, liver lobe or kidney exteriorized & abraded superficially ≤ 3x3cm margins using eg: coarse grit sandpaper/scrub brush / scalpel edge to create diffuse oozing bleed.

Bile Leakage

- Series of 18g – 20g needle punctures to gall bladder

Cholecystectomy

- Gallbladder removed from liver using standard technique
- Liver bed where gallbladder removed treated topically.

Intestinal Anastomosis Closure

- Small intestine longitudinally incised (≤ 5cm) or fully transected & closed using staples/sutures.
- Alternatively, create leak - series of 18g – 20g needle punctures
- +/- test sealing with intra-intestinal injection of saline

Splenic, Hepatic and/or nephric penetrating injury

- approx: 10mm diameter, 7mm deep puncture wound to create moderate/pulsatile bleed
- and/or surgical forceps pull tissue to create irregular surface wound

Partial Splenectomy, Hepatectomy, and /or Nephrectomy

- Spleen, liver lobe, &/or kidney exteriorized, distal tip excised to create diffuse/moderate bleed.
- &/or wedge resection performed to create moderate to severe bleed.
- Though unlikely, if untreatable, a complete splenectomy, lobular hepatectomy, or unilateral nephrectomy may be performed

Open Partial Nephrectomy

- Isolation & clamping of renal pedicle (clamping +/- using fingers only)
- Cold scissor resection of parenchyma opening the collecting system.
- if needed/desired running suture eg: Vicryl 2/0 to approximate tissues & close collecting system

Vessel Bleed

- Major vessel eg: splenic, renal, common hepatic artery, SVC …) partially clamped - section punctured with 3-10 needle holes using 18 - 20g
- Injury treated before or after continued reperfusion per chosen product mode of action

Vessel suture line bleeding

- Partial or total clamp large vessel - laceration ≤ 2cm - loosely suture
- Injury treated before or after continued reperfusion per chosen product mode of action

Adhesion reduction

- adhesion reduction agents applied over intestine / tissue / organ surfaces
- treated areas not to be used for later bleeding models - no tissue manipulation required
- may be undertaken at any time incl: post-euthanasia.

CARDIOTHORACIC & VASCULAR:

- *Positioning: Supine*
- *Complete sternotomy: xiphoid – manubrium (shears or saw to Manubrium then Lebsche knife or saw)*

Sternotomy *(as above)*

- Sternal bone edge bleeding treated with appropriate product/s.

Intra-mammary Artery (IMA) Dissection

- Either side of chest cavity lifted to expose underside of thoracic cavity
- tissue surface of thoracic cavity abraded using sandpaper or curette making several side by side approx.: 6cm longitudinal rows to simulate IMA dissection
- Alternatively, IMA may be dissected from tissue bed.

Diffuse/Local Epicardial Bleeding

- Epicardial surface &/or parietal surface abraded using a dry gauze, scrub brush, sandpaper to create a diffuse ooze mimicking oozing surgical bleed
- or superficially lacerated using scalpel to create localised mild bleed

Vascular Bleed +/- Graft / Patch

- Section of large vessel isolated clamped proximally & distally.
- PTFE, polyester, autologous or biologic patch/graft may be placed as an end-to-side anastomosis, end-to-end anastomosis, or as vascular patch using loosely placed sutures.
- Alternatively, arteriotomy performed & closed using loosely placed sutures.

Difficult to access vessel bleeding

- Deep injury – eg: needle puncture to vessel near subclavian

Needle hole bleeding

- needle hole w. or w/o. partial clamping (satinsky clamps)
- large vessel (vena cava, aorta) tissue perforated 1-3 needles holes 18 -20G
- may be performed between aorta & pulmonary artery after dissection of both vessels.

Cannulation site bleeding

- #11 blade puncture to partially clamped vena cava with suture closure (loose)

Pulmonary Reduction, Resection, or Biopsy

- Portion (≤ 5x5cm) of lung lobe reduced, wedge resection, incised, removed
- may be treated without closure or partially/fully closed using staple/suture prior to treating

Cardiac Puncture w. suture- TAVI incision simulation

- 2x purse string sutures L) ventricular apex (eg: 3.0 prolene)
- small incision # 11 blade on apex mimicking TAVI access
- tension suture to reduce/arrest bleeding then apply topical agent
- and/or apply topical agent without suture tension

Cardiac Puncture (non-sutured)

- # 11 blade puncture to left ventricle creating high volume, high-pressure bleed with no suture control.
- lesion treated with appropriate agent
- Though unlikely - if lesion cannot be controlled the animal will be euthanised.

only undertaken after all other bleeding interventions completed

Adhesion reduction

- Spray and/or film application large surface area – undertake at any time incl: post euthanasia

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NEUROSPINE:

- *Positioning: prone or supine – vertebrae accessed via ventral or dorsal approach per region of interest.*
- *Dorsal Approach: Dorsal midline skin incision; length 6+ vertebrae. Subcutaneous tissue, fascia, & supraspinous ligament incised exposing dorsal spinal processes. Paravertebral muscles elevated from vertebrae to expose transverse processes and disc space*
- *Dorsolateral Approach: Incision 1-2 cm lateral to dorsal midline; length 6+ vertebrae. Subcutaneous fat elevated & paravertebral muscles bluntly dissected exposing intervertebral disc*

Spine: Corpectomy

- vertebral body / adjacent vertebral discs removed creating bone and adjacent vessel bleeding

Spine: Laminectomy / Partial Laminectomy

- vertebral lamina full/partial removal creating bone and adjacent vessel bleeding
- Dilated epidural veins needle hole punctures (21g)

Spine: Hemi-laminectomy

- vertebral lamina removed
- Dilated epidural veins needle hole punctures (21g)
- Dura incised – length up to 2cm to induce intradural vein/artery bleed

Spine: Posterolateral Fusion (PLF)

- paravertebral muscles elevated from transverse processes creating adjacent vessel bleeding.
- Bone Graft Substitute placed between cranial / caudal transverse processes *(in absence of cage or fixation device – enables basic review only of in-vivo handling characteristics)*

Spine: Dura defect

- Dura incision - $\leq$ 2cm – loose closure with suture – sealant application over closure
- Options: Tisseel, Tachosil, Hemopatch

Neuro: Craniotomy / Craniectomy

- Epicranium incised, craniotomy - cranial perforator (9–14mm) w. auto declutching
- Craniectomy, up to 2cm x 2cm, Gigli's saw or similar
- Dura bleeding - minor laceration longitudinal sinus sufficient to create continuous ooze
- Parenchymal excision up to 1x1cm to simulate bleeding tumour bed
- CSF leakage - dura incised up to 2cm length
- Dura defect up to 3mm
