Leeds Major Trauma Centre

Welcome to the Leeds Major Trauma Centre

"Our aim is to save lives and return people to life free from disability"

Trauma Laparotomy and Thoracotomy: indications, principles and limitations

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LTHNT MTC Education programme
11 Nov 2016

Content

- Resuscitative thoracotomy
- Command huddle
- Communication in damage control resuscitation
- Trauma laparotomy

TRAUMATIC CARDIAC ARREST GUIDELINE

West Yorkshire Major Trauma Network

TRAUMATIC CARDIAC ARREST IN THE EMERGENCY DEPARTMENT OR DURING AMBULANCE TRANSFER TO THE FACILITY [1,7]

- ETT OR LMA (No drugs required)
- STOP CHEST COMPRESSIONS OR CONTINUE WITH CAUTION[2]
- BILATERAL THORACOSTOMIES
- CONTROL BLEEDING (DIRECT PRESSURE +/- TOURNIQUET) AND BIND PELVIS (in blunt trauma)
- LARGE BORE ACCESS WITH BLOOD/FLUID (4 UNITS IDEALLY)
- CONSIDER PERI-MORTEM DELIVERY OF BABY IF >20 WKS (ideally after 3-4 minutes of maternal arrest and before 20 minutes post arrest)[5,6]

RETURN OF SPONTANEOUS CIRCULATION (ROSC)

YES

- USS FOR PERICARDIAL EFFUSION
- INVASIVE MONITORING
- CT/THEATRE
- BLOOD PRODUCTS
- TXA
- SEDATION AND PARALYSIS
- DISPOSITION

NO

ELECTRICAL ACTIVITY

NO

ULTRASOUND

ASYSTOLE AND NO PERICARDIAL EFFUSION

STOP

ASYSTOLE AND PERICARDIAL EFFUSION

YES

THORACOTOMY

- RELIEF OF TAMPONADE
- COMPRESS OR CLAMP AORTA
- CONTROL BLEEDING
- INTERNAL CARDIAC MASSAGE

ONGOING BLOOD AND PRODUCTS REQUIREMENTS WITH NO OUTPUT OR RECURRENT VF/AGONAL CARDIAC EFFORT

CONSULTANT DECISION TO STOP RESUSCITATION

SUCCESSFUL THORACOTOMY

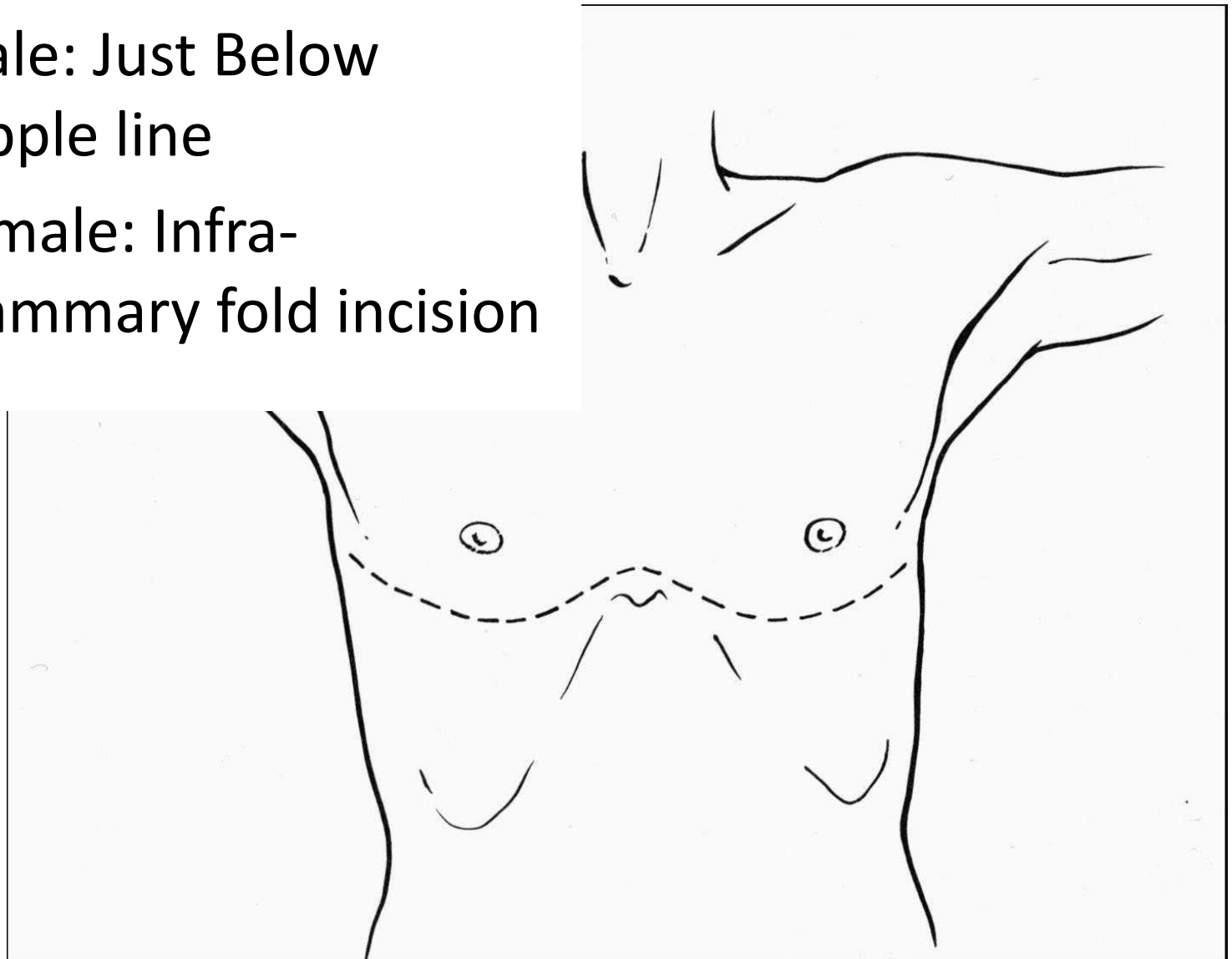
PREPARATION AND CONCURRENT ACTIVITY CHECKLIST

- PRE- ALERT TRAUMA TEAM AND VASCULAR CONSULTANT
- ALLOCATE ROLES- YOU CANNOT PERFORM THORACOTOMY AND BE TEAM LEADER
- SEND A RUNNER FOR 4 UNITS O-ve BLOOD & WARN LAB OF MAJOR HAEMORRHAGE (SEND G&S ASAP)
- TURN ON US MACHINE
- PREPARE FLUID WARMER
- ALERT THEATRE AND CT
- PREPARE THORACOTOMY PACK
- TIME-KEEPER/SCRIBE TO BE KEPT SEPARATE FROM CLINICAL TEAM

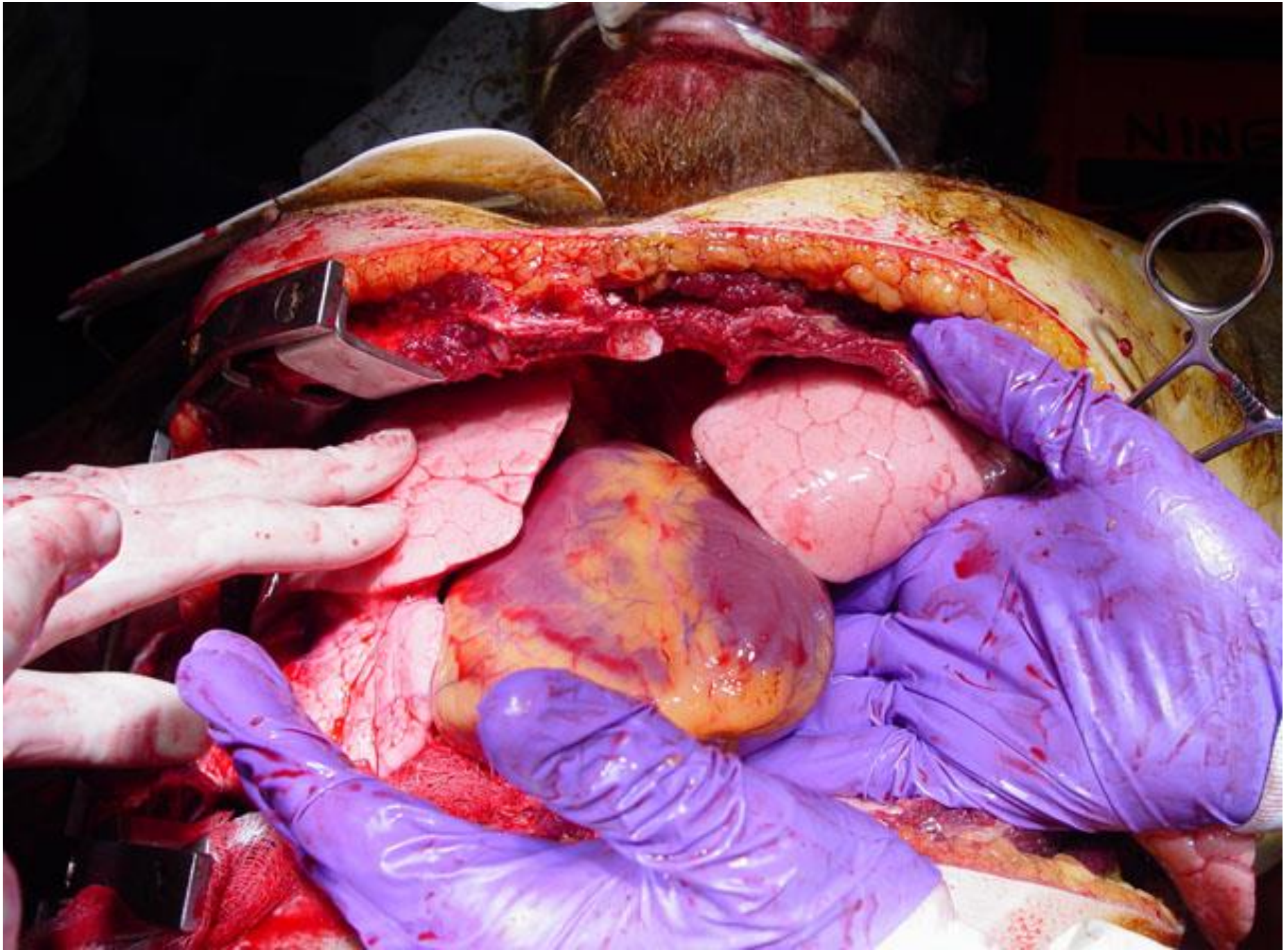
If ROSC achieved and further advice needed contact cardiac surgical OR thoracic surgical consultant on-call at LTHT

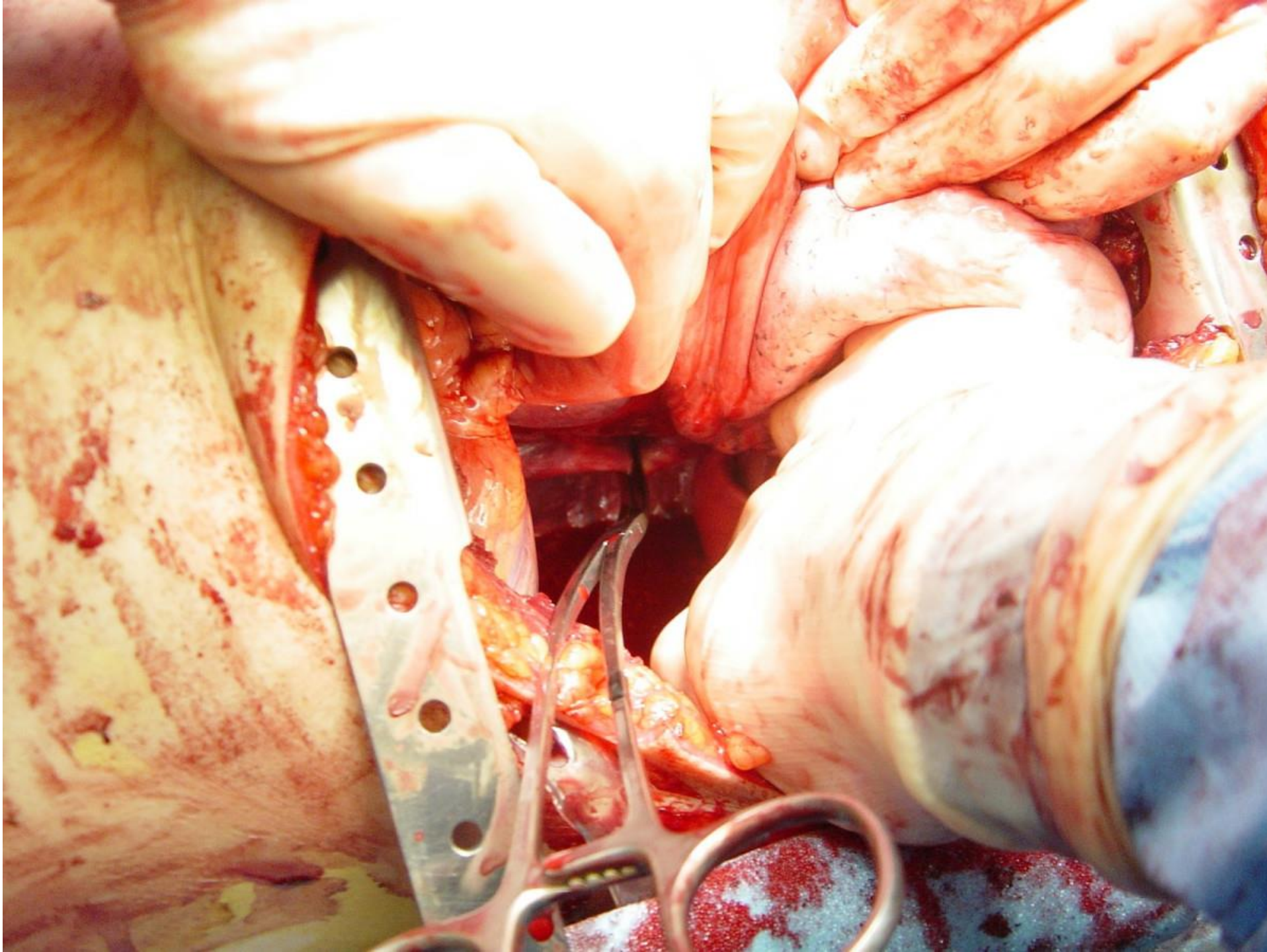
Clam Shell Incision

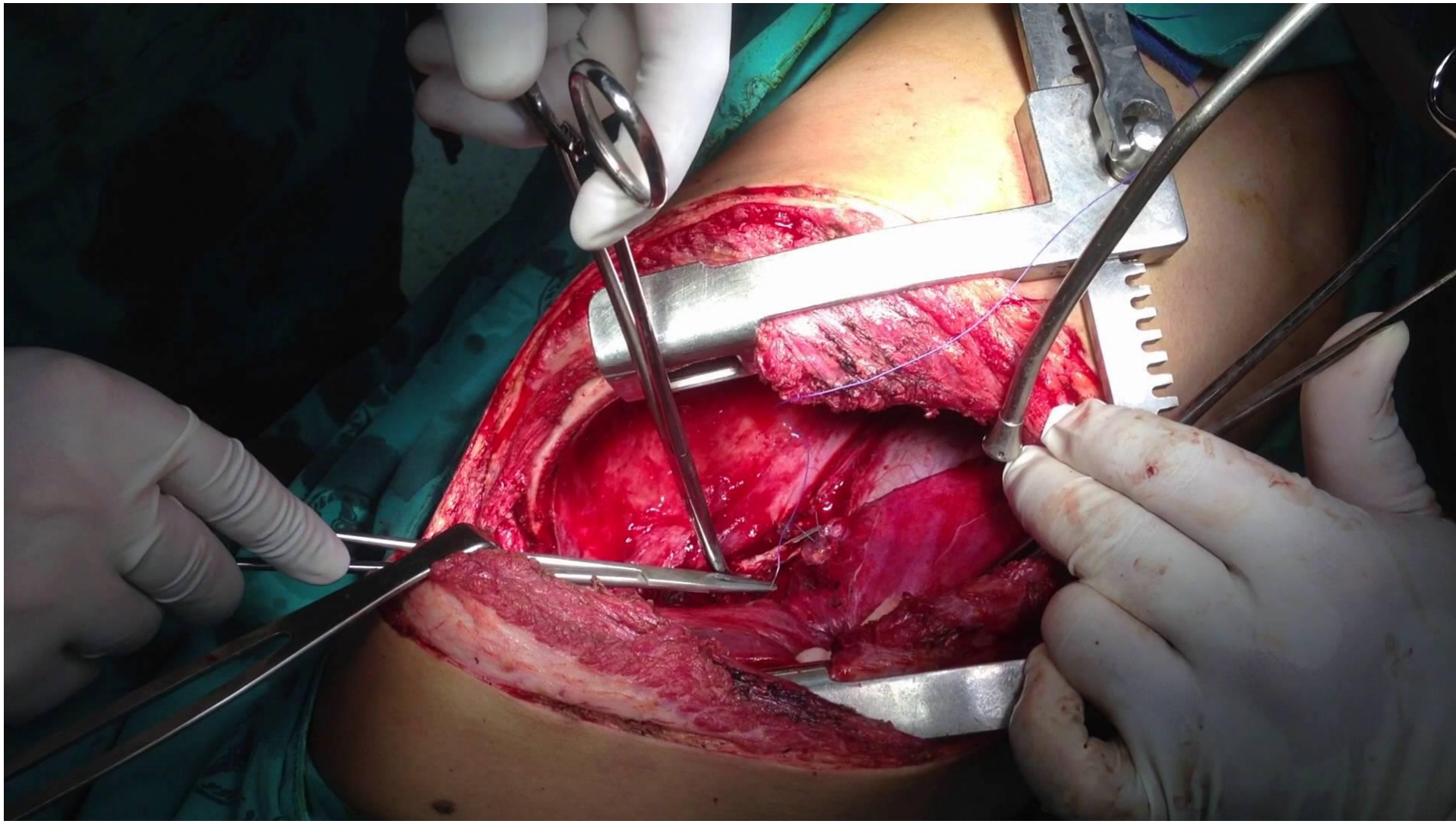
- Male: Just Below Nipple line
- Female: Infra-mammary fold incision



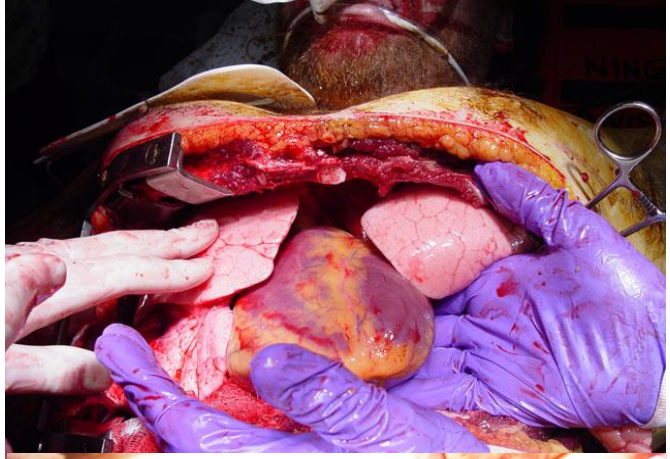
Better access to the great vessel origins and apices

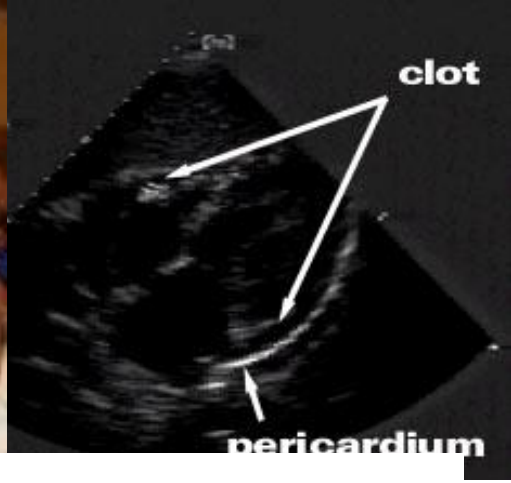


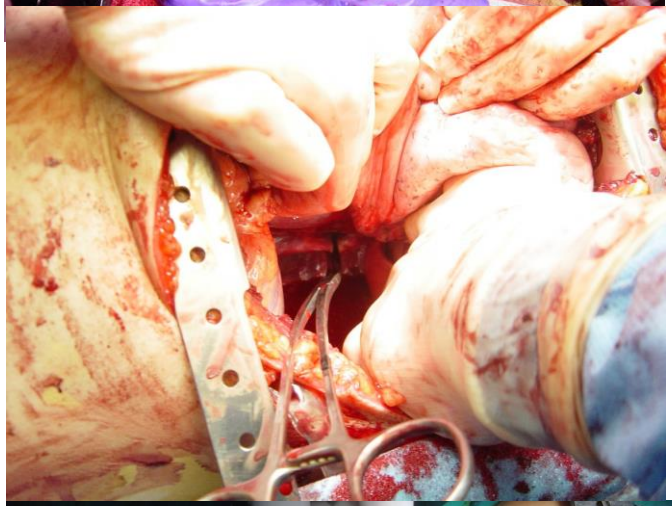


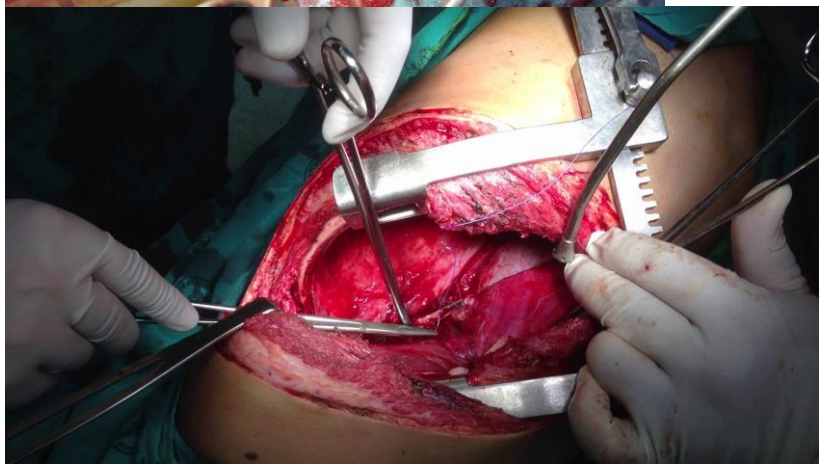


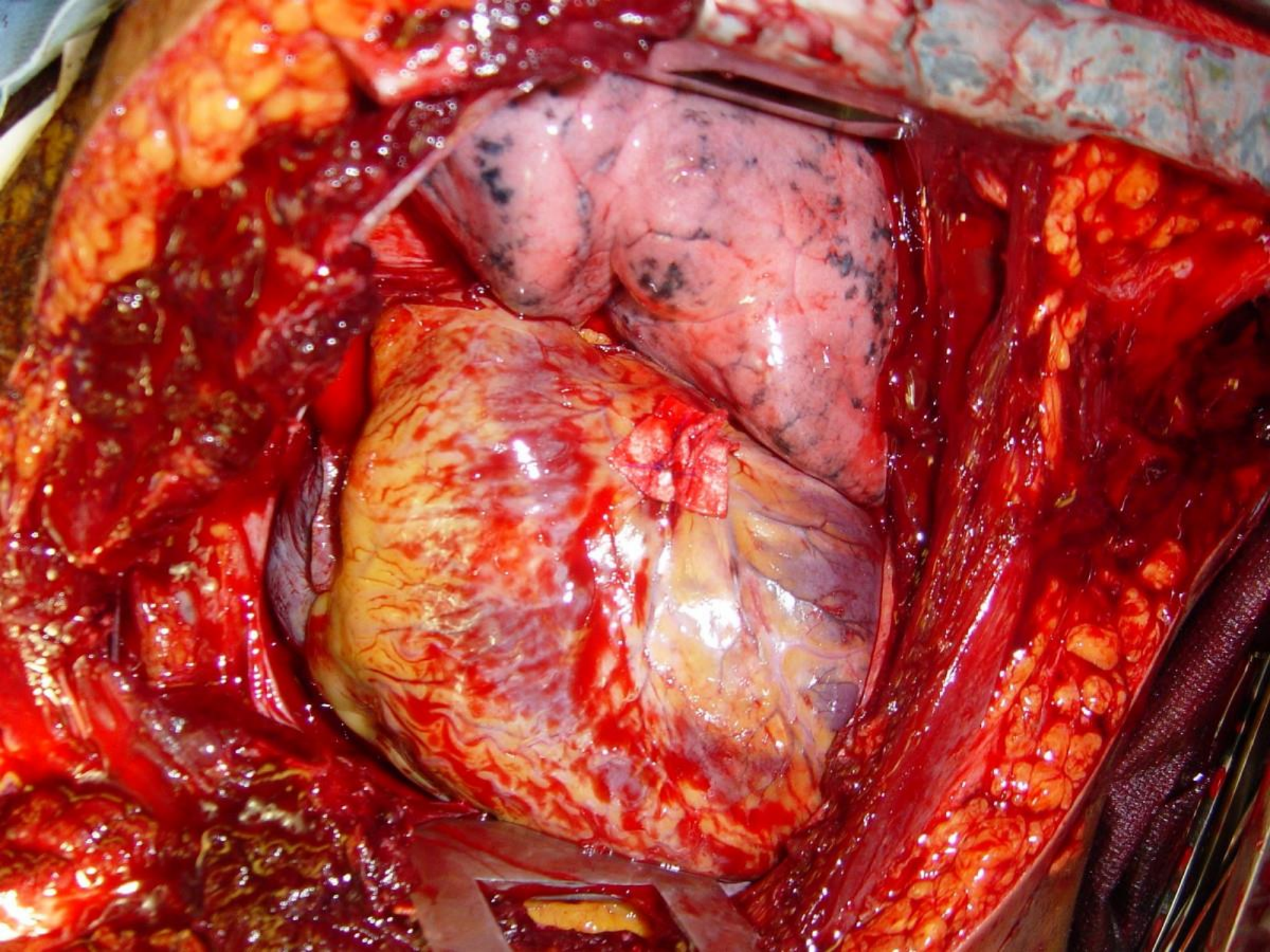
The apex and intercostals can be very tricky….




clot
pericardium







Resuscitative Thoracotomy outcomes

Injury Pattern	Shock	No Vital Signs	No Signs Of Life	Total
Cardiac				
Denver (57)	3/9 (33%)	0/7 (0%)	1/53 (2%)	4/69 (6%)
Detroit (58)	9/42 (21%)	3/110 (3%)		12/152 (8%)
Johannesburg (59)				13/108 (12%)
Los Angeles (60)	2/5 (40%)	6/11 (55%)	2/55 (4%)	10/71 (14%)
New York (61)	7/20 (35%)	18/53 (32%)	0/18 (0%)	24/91 (26%)
San Francisco (62)	18/37 (49%)	0/25 (0%)		18/63 (29%)
Seattle (63)	4/11 (36%)	11/47 (23%)		15/58 (26%)
Overall	**43/124 (35%)**	**47/254 (19%)**	**4/126 (3%)**	**96/612 (16%)**
Penetrating				
Denver (15)	19/78 (24%)	14/399 (4%)		33/477 (7%)
Detroit (58)	9/42 (21%)	3/110 (3%)		12/152 (8%)
Houston (64)	14/156 (9%)	18/162 (11%)		32/318 (10%)
Indianapolis (65)	3/7 (43%)	1/50 (2%)	0/80 (0%)	4/137 (3%)
Johannesburg (59)	31/413 (8%)	10/149 (7%)	1/108 (1%)	42/670 (6%)
Los Angeles (60)	2/5 (40%)	6/11 (55%)	2/55 (4%)	10/71 (14%)
New York (66)	8/32 (25%)	8/77 (10%)	0/25 (0%)	16/134 (12%)
Oakland (67)	8/24 (33%)		2/228 (1%)	10/252 (4%)
San Francisco (62)				32/198 (30%)
Seattle (63)	4/11 (36%)	11/47 (23%)		15/58 (25%)
Washington (68)	7/13 (54%)	3/47 (6%)		10/60 (17%)
Overall	**145/1007 (14%)**	**100/1252 (8%)**	**6/615 (1%)**	**283/2986 (10%)**
Blunt				
Denver (15)	4/86 (5%)	4/311 (1%)		8/397 (2%)
Houston (64)	0/42 (0%)	0/27 (0%)		0/69 (0%)
Johannesburg (59)	1/109 (1%)	0/39 (0%)	0/28 (0%)	1/176 (1%)
San Francisco (62)				1/60 (2%)
Seattle (63)				1/88 (1%)
Overall	**5/237 (2%)**	**4/377 (1%)**	**0/28 (0%)**	**11/790 (1.4%)**

World J Emerg Surg. 2006; 1: 4. PMCID: PMC1459269
Published online 2006 Mar 24. doi: 10.1186/1749-7922-1-4

Emergency department thoracotomy for the critically injured patient: Objectives, indications, and outcomes

C Clay Cothren[1] and Ernest E Moore[1]

Resuscitative Thoracotomy complications

- One handed ICM technique: fracture of ventricle with thumb
- Using the coronary artery as a buttress to a suture of cardiac laceration
- Incorporating the pulmonary hilum into the division of inferior pulmonary ligament
- Clamping the aorta and then over resuscitating
- Cardiac arrest on primary closure of cavity
- Retained haemothorax: empyema
- Health care worker injury

Ann Surg. 1983 Apr;197(4):459-63.

The effects of thoracic aortic cross-clamping and declamping on visceral organ blood flow.

Oyama M, McNamara JJ, Suehiro GT, Suehiro A, Sue-Ako K.

Abstract

Blood flow was measured using radioactive microspheres in 11 macaque monkeys 1) before hemorrhage shock, 2) after onset of shock, 3) after aortic cross-clamping and resuscitation, and 4) after release of the cross-clamp and stabilization. Hemodynamic parameters (cardiac output, arterial, right atrial and left atrial pressure) and blood gases were also monitored. Total abdominal organ flow fell with hemorrhage and fell further with aortic clamping. Reinfusion of shed volume did not restore abdominal organ flow (4.7% baselines) but increased LAP and cardiac output to the upper body. Release of the cross-clamp produced profound acidosis that was treated effectively with NcHCO3. After stabilization of blood, flow to kidney remained low (49% baseline) although intestinal flow was increased threefold (320% of baseline). It is clear that thoracic aortic cross-clamping in shock further compromises already reduced visceral blood flow and may contribute to the problem of ischemic multiple organ failure after resuscitation from hemorrhagic shock.

Command huddle

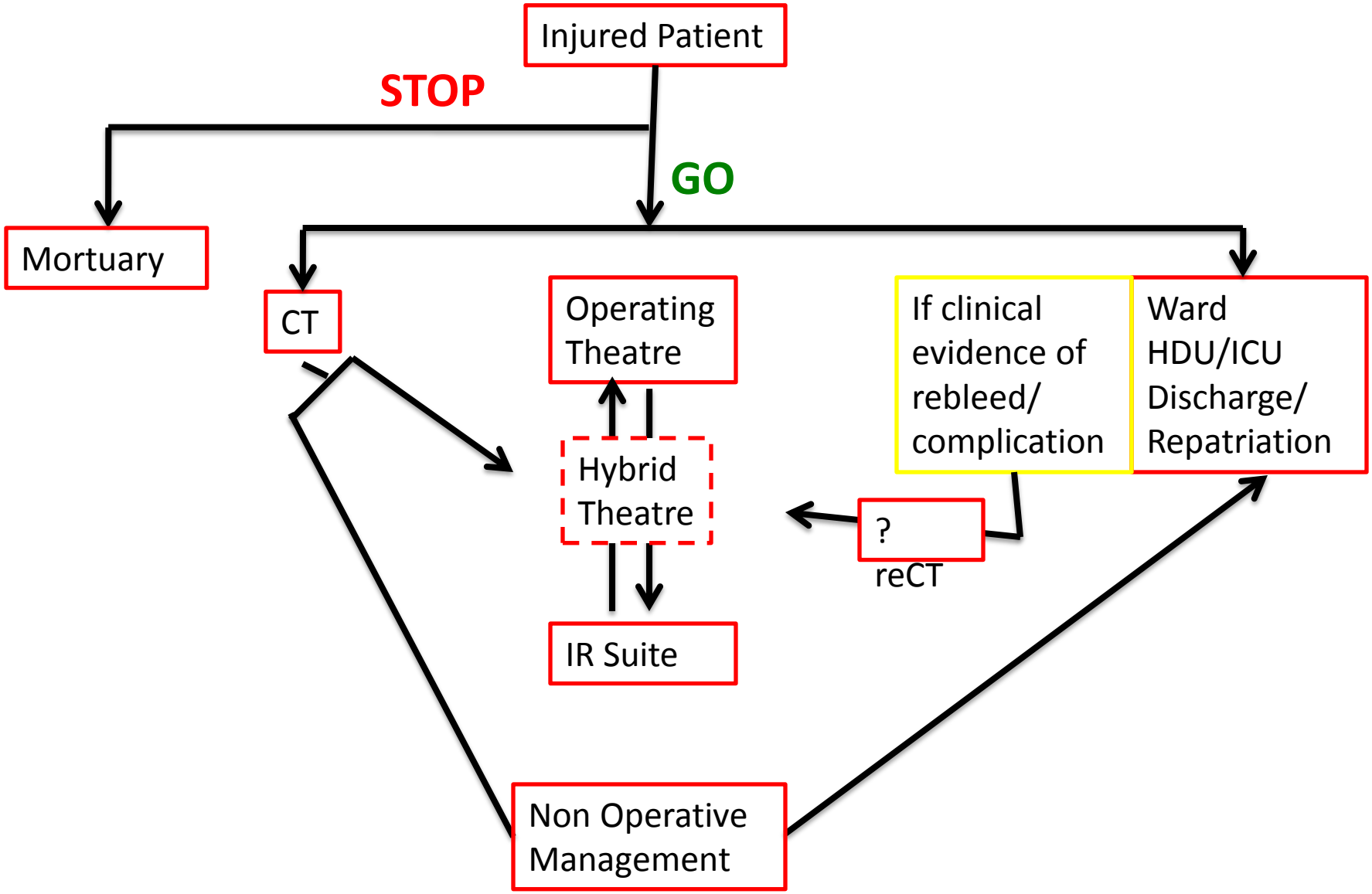
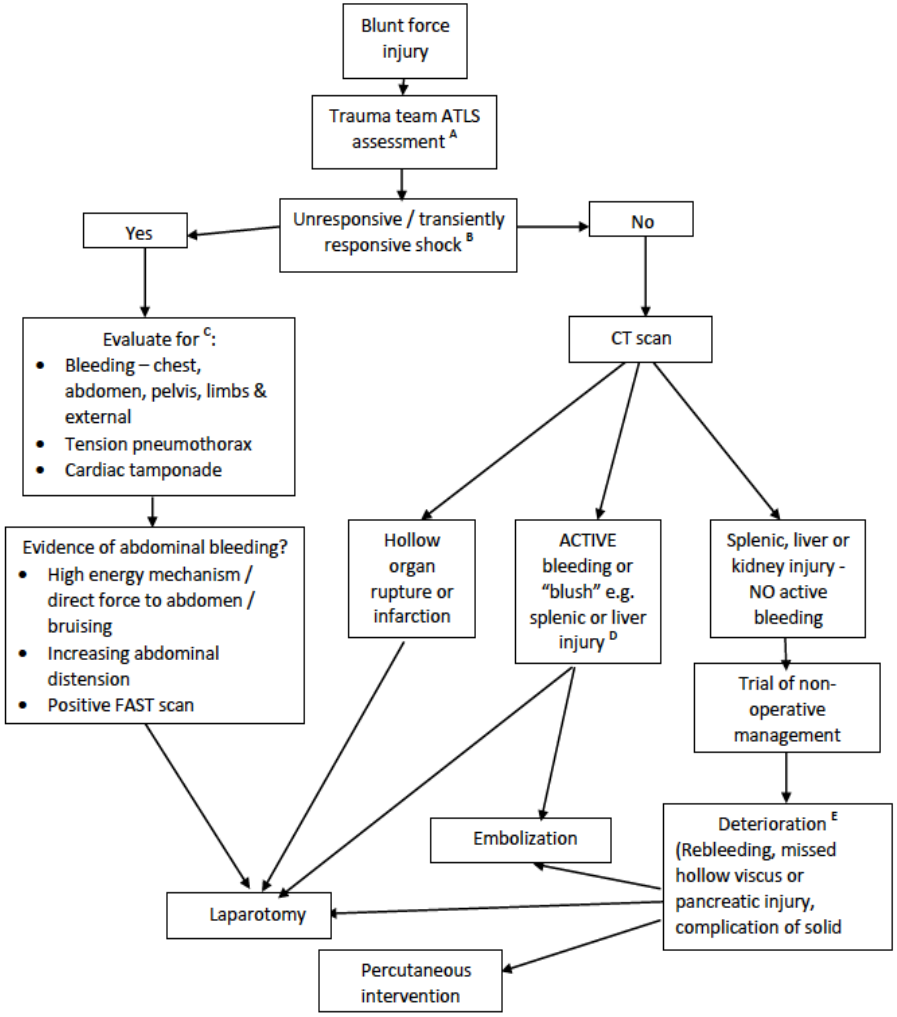


Figure 1: Management algorithm for blunt abdominal injury

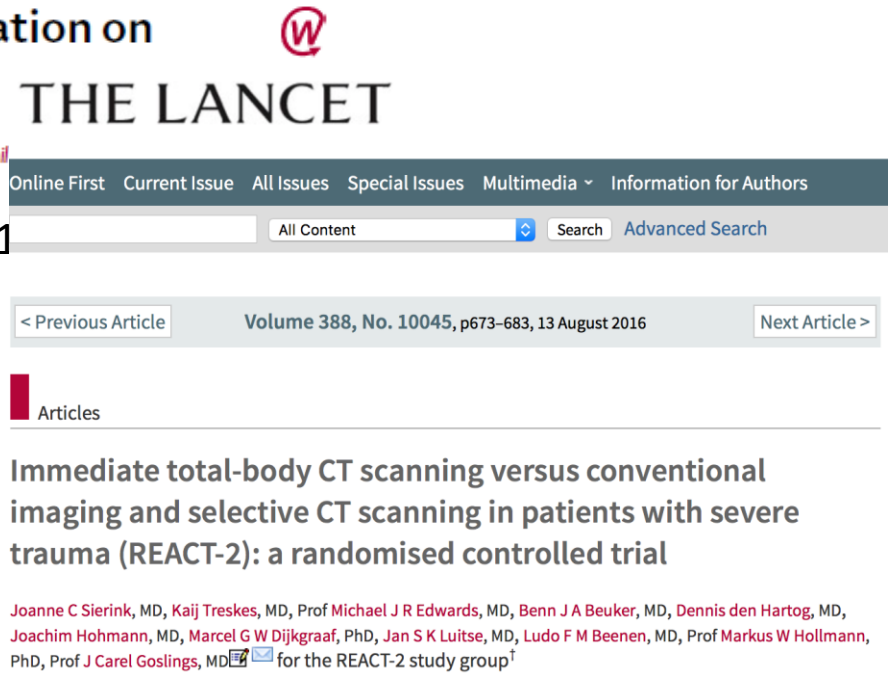


Does CT save lives?

Effect of whole-body CT during trauma resuscitation on survival: a retrospective, multicentre study

*Stefan Huber-Wagner, Rolf Lefering, Lars-Mikael Qvick, Markus Körner, Michael V Kay, Klaus-Jürgen Pfeifer, Maximil Karl-Georg Kanz, on behalf of the Working Group on Polytrauma of the German Trauma Society**

Huber-Wagner S et al. Lancet 2009; 373: 1455-1



Vital for SNOM, IR and neurosurgcial decision making

Catastrophic haemorrhage needs immediate treatment despite uncertainty to CNS lesion

Which cavity first?

Injuries probably requiring OT first

- GSW chest/abdm, SBP 70, clamp on T. Aorta
- Blast – lower limbs blown off, torso/ abdm fragmentation wounding, Fast +ve, massive transfusion ongoing
- Jumped 50ft from building CPR ongoing
- Paedestrian vs car at 40mph, SBP 70, Chest drain blood
- Precordial stab CPR 10mins

If going to the OT

1. Let OT know
2. Cell Salvage
3. Turn off the laminar flow
4. Turn the OT temp to max
5. Buy a:

Should we do DCS?

- Operative strategy that sacrifices completeness for the immediate surgical repair in order to address the consequences of the double hit of the injury and then added surgery*
- Indications
  - ISS >25
  - SBP <70mmHg
  - Core temp <34^{o}C
  - pH <7.1
- Rationale
  - Must be done promptly
  - Prevent further spiral in to lethal triad

*Midwinter. *JR Army Med Corps*; 155: 323

DCS indication

Table 1. Indications for damage control

1. Hemodynamic instability
2. Coagulopathy on presentation or during operation (clinical or laboratory)
3. Severe metabolic acidosis (pH <7.2 or base deficit >8)
4. Hypothermia on presentation (<35°C)
5. Prohibitive operative time required to repair injuries (>90 mins)
6. High-energy blunt torso trauma
7. Multiple penetrating torso injuries
8. Multiple visceral injuries with major vascular trauma
9. Multiple injuries across body cavities
10. Massive transfusion requirements (>10 units packed red blood cells)
11. Presence of injuries better treated with nonsurgical adjuncts

Waibel et al. Damage control in trauma and abdominal sepsis. Crit Care Med 2010 38:S421-430

What I'm thinking

- How sick is this patient?
- How much blood can the patient lose in this environment?
- Which surgical strategy is going to most benefit the patients physiology over the next 24hrs? *verses* which surgical strategy is going to provide the least morbidity?
- Which surgical strategy is going to fail best?

PERSONAL VIEW

Optimising Communication in the Damage Control Resuscitation– Damage Control Surgery Sequence in Major Trauma Management

GS Arul[1], HEJ Pugh[2], SJ Mercer[3], MJ Midwinter[4]

[1]Consultant Surgeon, 212 Field Hospital, Endcliffe Hall, Sheffield, UK; [2]Consultant Anaesthetist, 144 Parachute Medical Squadron, 16 Medical Regiment, Colchester, UK; [3]Consultant Anaesthetist, Royal Navy, University Hospital Aintree, Liverpool, UK; [4]Defence Professor of Surgery, ADMST, Royal Centre for Defence Medicine, Birmingham Research Park, Vincent Drive, Birmingham, UK

Abstract

Damag... Control Resuscitation and Dam... Control Surgery (DCR-DCS) in... accordi... betwee... interve... forgott... A syste... stages ... Comma... in the ... maintai...

Human factors in contingency operations

Simon J Mercer,[1] MA Khan,[2] T Scott,[3] JJ Matthews,[4] DCW Henning,[5,6] S Stapley[7]

ABSTRACT

The UK Defence Medical Services are currently supporting contingency operations following a period of intensive activity in relatively mature trauma systems in Iraq and Afghanistan. Among the key lessons identified, human factors or non-technical skills played an important role in the improvement of patient care. This article describes the importance of

Role 2 or Role 3 providing support to 127 Squadron (16 Medical Regiment), Role 2 Land Based (in support of the British Army and Royal Marines), Role 2 Afloat (R2A), Vanguard Role 3 Field Hospital and the Primary Casualty Receiving Facility (RFA ARGUS).

For more than a decade, the DMS was operational in both Iraq (Operation

followership, communication and situational awareness with individual systems developed for anaesthetists,[16] surgeons[17] and scrub practitioners.[18] This paper concentrates on the importance of human factors on a Role 2 Afloat (R2A) platform, as the authors have considerable recent experience in this environment, but the concepts are readily transferable to other small teams deployed either on military contingency operations or on civilian disaster relief settings.

ROLE 2 AFLOAT

The modern configuration of R2A has already been described[19] and the composition of the team is noted in Box 1. The

Communication in DCR/DCS

The Trauma "WHO"	SNAP Brief	SIT –REPS (every 10-30mins)
1. Command Huddle (**STOP** or **GO**): Gen Surg/ Ortho/ Anaesth/ ED/ IR	Patient identification	S – SBP (and surgical progress)
2. SNAP Brief	Clinical/Ix findings, Surgical Plan (A,B,C..), duration of surgery proposed	T – Temp (and time)
3. SIT REPS	Anaesthetic brief see STACK	A – Acidosis/ BE
4. Debrief		C - Coagulation
		K – Kit (including blood products used, rate and requested)


Still Bleeding. Where from?