



Torakotomie jako součást resuscitace

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Oddělení urgentní medicíny

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- Problém definice – co to znamená?
- Pouze pro pacienty *in extremis*
- “resuscitační torakotomie”
- Prováděná na Emergency

Emergency Department Thoracotomy

- Spadá do procedur Damage control
- Operuji pro obnovu fyziologických funkcí
- Specifická skupina pacientů

Traumatická zástava oběhu – existuje nějaká šance?



TABLE 4. Survival Point Estimates and Associated 95% CIs

Study	Total Survivors, n (%)	95% CI*
Shimazu and Shatney, 1983	7/267 (2.6)	1.2–5.4%
Aprahamian et al., 1985	3/95 (3.2)	0.07–9.3%
Wright et al., 1989	0/67 (0)	0–0.047%
Esposito et al., 1991	1/97 (1.0)	0.0003–0.056%
Rosemurgy et al., 1993	0/124 (0)	0–2.9%
Fulton et al., 1995	6/245 (2.4)	0.1–5.3%
Stratton et al., 1998	9/879 (1.0)	0.5–2.0%
Battistella et al., 1999	16/602 (2.7)	1.6–4.3%
Stockinger and McSwain, 2004	15/588 (2.6)	1.5–4.2%
Pickens et al., 2005	14/184 (7.6)	4.5–12.5%
Willis et al., 2006	4/1,327 (0.3)	0.01–0.59%
Moriwaki et al., 2010	13/477 (2.7)	1.6–4.7%
Tarney et al., 2011	4/52 (7.7)	2.1–18.5%
Mollberg et al., 2011	1/294 (0.3)	0.1–1.88%

*95% CIs were calculated using the Agresti-Coull approximate binomial CI calculation method.



Outcome in 757 severely injured patients with traumatic cardiorespiratory arrest[☆]

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Thomas Paffrath^b, Wolf Mutschler^a, Karl-Georg Kanz^a,

Working Group on Polytrauma of the German Trauma Society (DGU)¹

AIS head ≥ 3 (%)	64.7
AIS thorax ≥ 3 (%)	71.5
AIS abdomen ≥ 3 (%)	38.7
AIS extremities ≥ 3 (%)	42.7
Overall survival rate (%)	17.2

Withholding and termination of resuscitation of adult cardiopulmonary arrest secondary to trauma: Resource document to the joint NAEMSP-ACSCOT position statements

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- Bezpečnost posádek !!!
- Náklady !!!
- GOS traumatických zástav !!!

TABLE 5. Asystole as a Predictor for Outcome of Resuscitation

Study	Study Population	Patients in Asystole, n (% of Total Patients)	Patients in Asystole Who Lived With Good Outcome, n (% of Total Patients)
Aprahamian et al., 1985	95 patients in traumatic arrest	51 (53.7)	0 (0)
Esposito et al., 1991	112 EDT patients	16 (14.3)	0 (0)
Stratton et al., 1998	497 patients in traumatic arrest	Data not provided	0 (0)
Battistella et al., 1999	604 patients in traumatic arrest	212 (35.1)	0 (0)
Powell et al., 2004	959 EDT patients	6 (0.62)	5 (0.52)
Seamon et al., 2008	180 EDT patients for penetrating injury	62 (34.4)	3 (1.8)
Moriwaki et al., 2010	477 patients in arrest from blunt trauma	313 (65.6)	0 (0)
Moore et al., 2011	56 patients that survived EDT (total patients that had EDT not provided)	7 (12.5)	3 (5.4)
Tarmey et al., 2011	52 patients in traumatic arrest	29 (56)	0 (0)

Good outcome is defined as mild or no neurologic deficit.

TABLE 2. 2012 Position on Withholding Resuscitation in Traumatic Cardiopulmonary Arrest

It is appropriate to withhold resuscitative efforts for certain trauma patients for whom death is the predictable outcome.

Resuscitative efforts should be withheld for trauma patients with injuries that are obviously incompatible with life, such as decapitation or hemicorporectomy.

Resuscitative efforts should be withheld for patients of either blunt or penetrating trauma when there is evidence of prolonged cardiac arrest, including rigor mortis or dependent lividity.

Resuscitative efforts may be withheld for a blunt trauma patient who, on the arrival of EMS personnel, is found to be apneic, pulseless, and without organized electrocardiographic activity.

Resuscitative efforts may be withheld for a penetrating trauma patient who, on arrival of EMS personnel, is found to be pulseless and apneic and there are no other signs of life, including spontaneous movement, electrocardiographic activity, and papillary response.

When the mechanism of injury does not correlate with the clinical condition, suggesting a nontraumatic cause of cardiac arrest, standard resuscitative measures should be followed.

TABLE 3. 2012 Position on TOR of Traumatic Cardiopulmonary Arrest

A principle focus of EMS treatment of trauma patients is efficient evacuation to definitive care, where major blood loss can be corrected. Resuscitative efforts should not prolong on-scene time.

EMS systems should have protocols that allow EMS providers to terminate resuscitative efforts for certain adult patients in traumatic cardiopulmonary arrest.

TOR may be considered when there are no signs of life and there is no ROSC despite appropriate field EMS treatment that includes minimally interrupted CPR.

Protocols should require a specific interval of CPR that accompanies other resuscitative interventions. Past guidance has indicated that up to 15 min of CPR should be provided before resuscitative efforts are terminated, but the science in this regard remains unclear.

TOR protocols should be accompanied by standard procedures to ensure appropriate management of the deceased patient in the field and adequate support services for the patient's family.

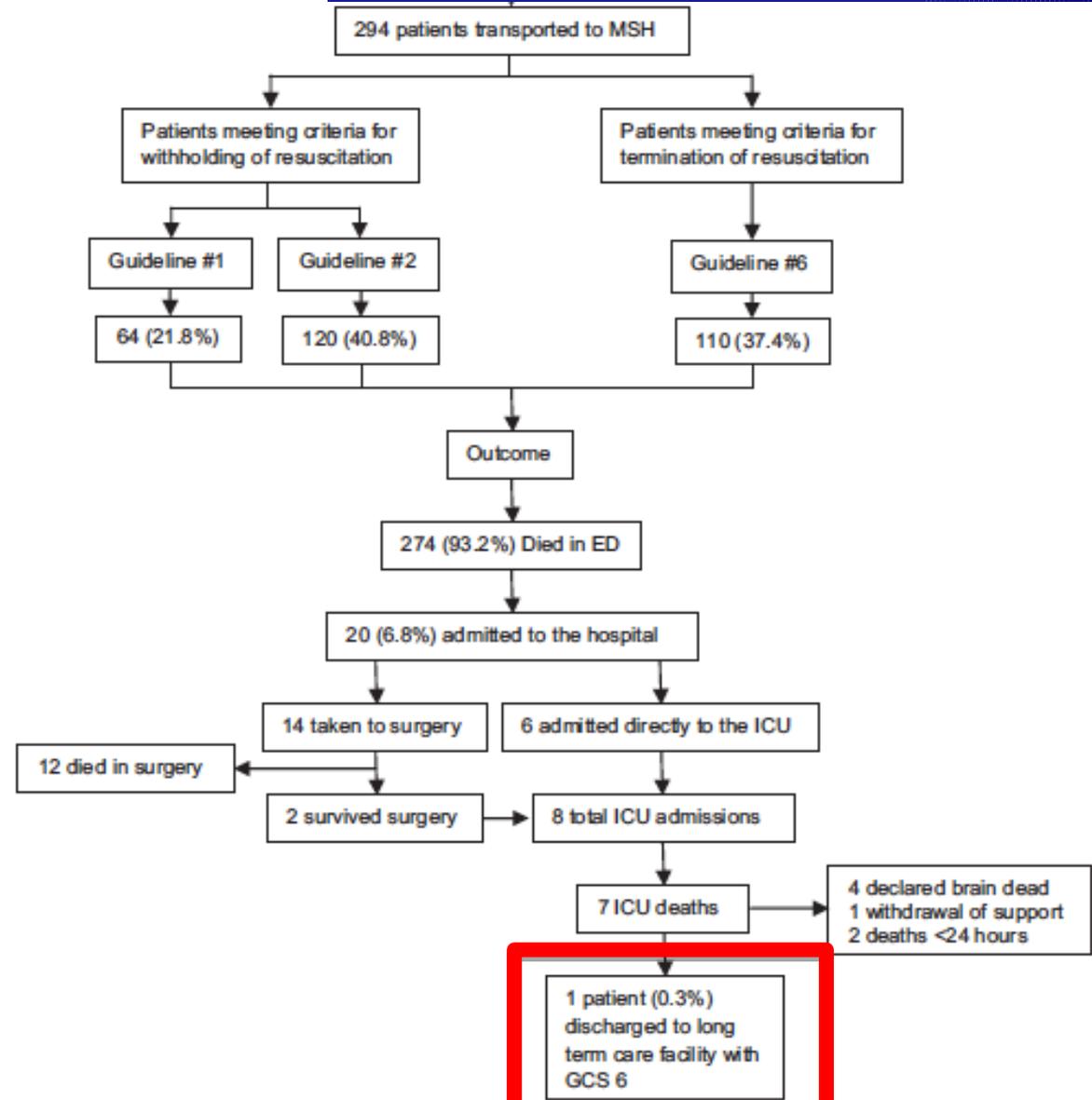
Implementation of TOR protocols mandates active physician oversight.

TOR protocols should include any locally specific clinical, environmental, or population-based situations for which the protocol is not applicable. TOR may be impractical after transport has been initiated.

Further research is appropriate to determine the optimal duration of CPR before terminating resuscitative efforts.

The Consequences of Noncompliance With Guidelines for Withholding or Terminating Resuscitation in Traumatic Cardiac Arrest Patients

(*J Trauma*. 2011;71: 997–1002)



Co musím zvážit?

- Čas od úrazu
- Přidružená poranění – reálná přežitelnost
- Současný stav pacienta
- Svoji zkušenost/dovednosti/možnosti

Co potřebuji?

- Zkušeného chirurga
- instrumentárium
- Dokonalou spolupráci anestesie
- Logistiku MTP

Co mi EDT poskytne?

- Při klampu hrudní aorty 25 (30) minut času na řešení krváčení
- Rizikovou situaci – poranění personálu
- Skepsi – personál musí znát bezvýchodnost situace

Proč indikují – fyziologie

- Uvolnění srdeční tamponády a zástava krvácení ze srdce
- Zástava nitrohručního krvácení
- Otevřená srdeční masáž
- Klamp descendetní hrudní aorty

Kdy indikují ?

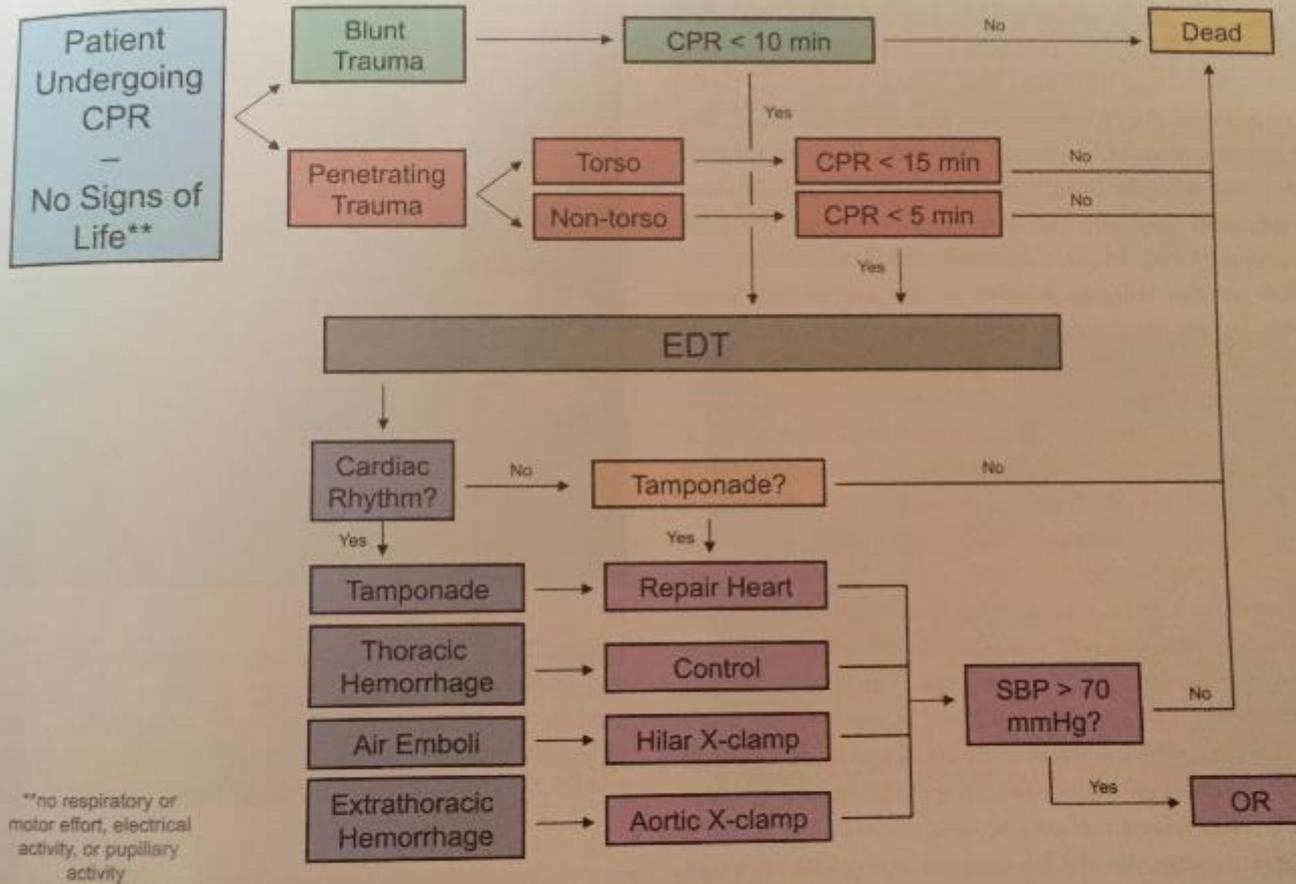
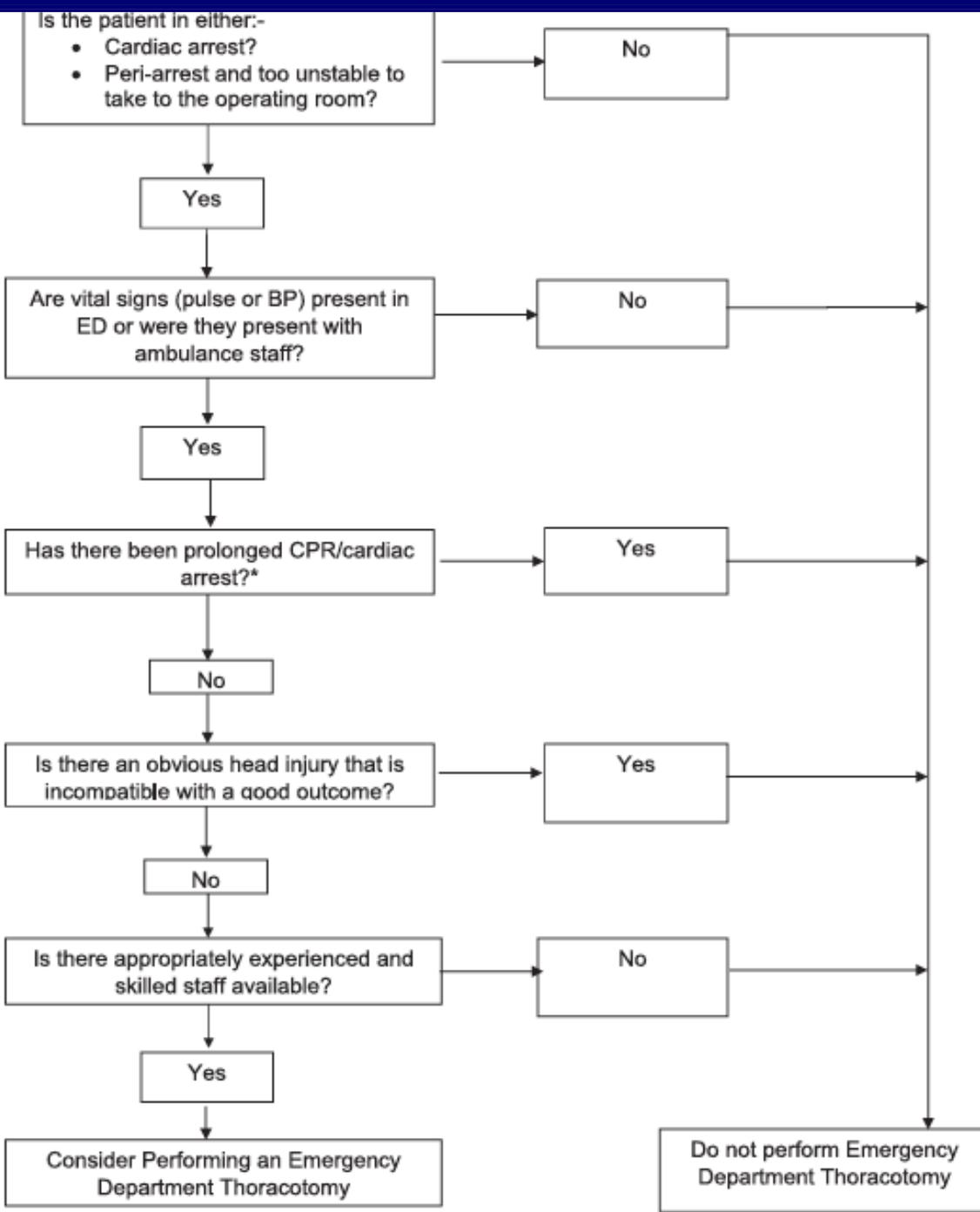


FIGURE 14-1 Algorithm directing the use of EDT in the multiply injured trauma patient.

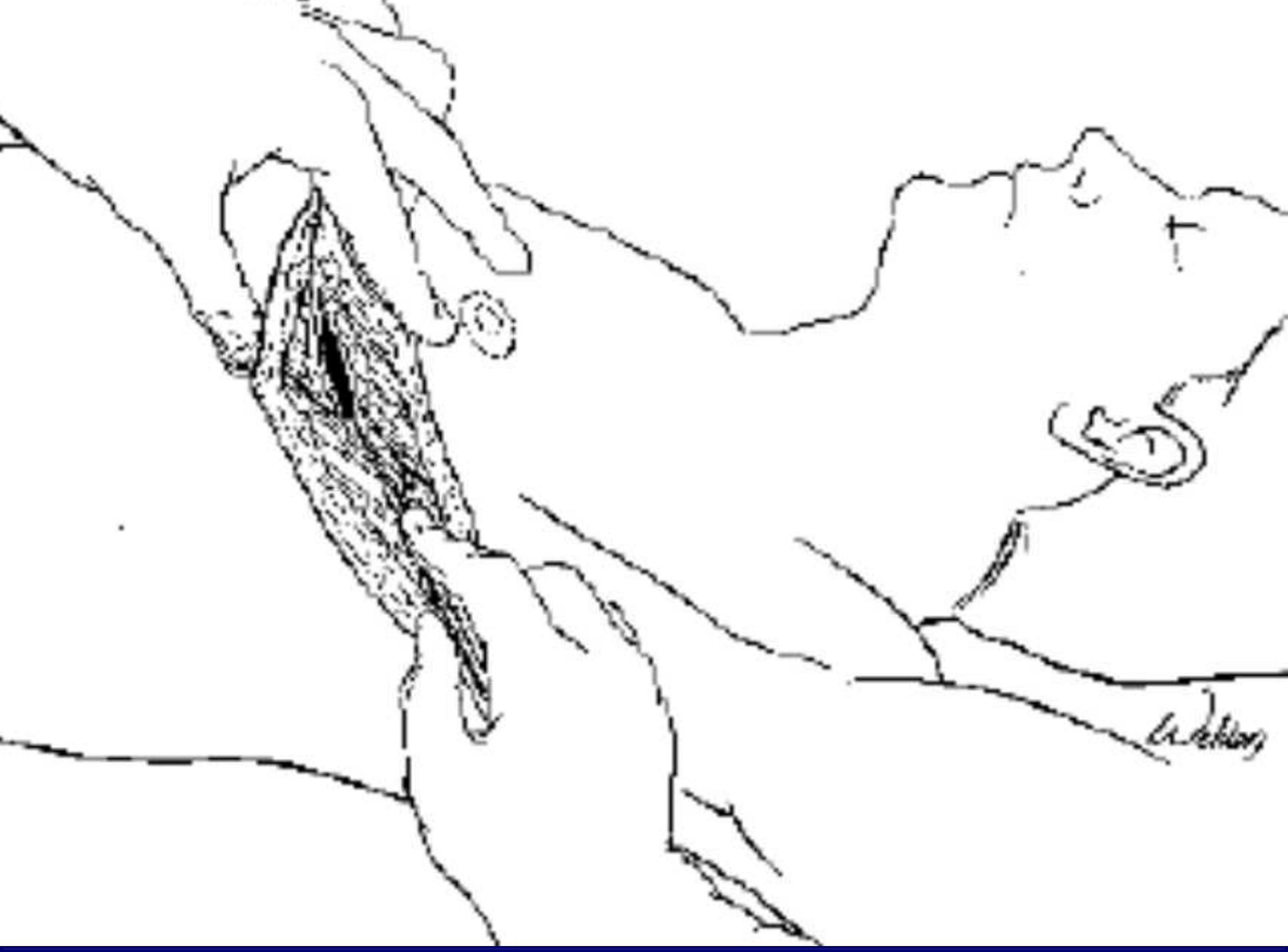


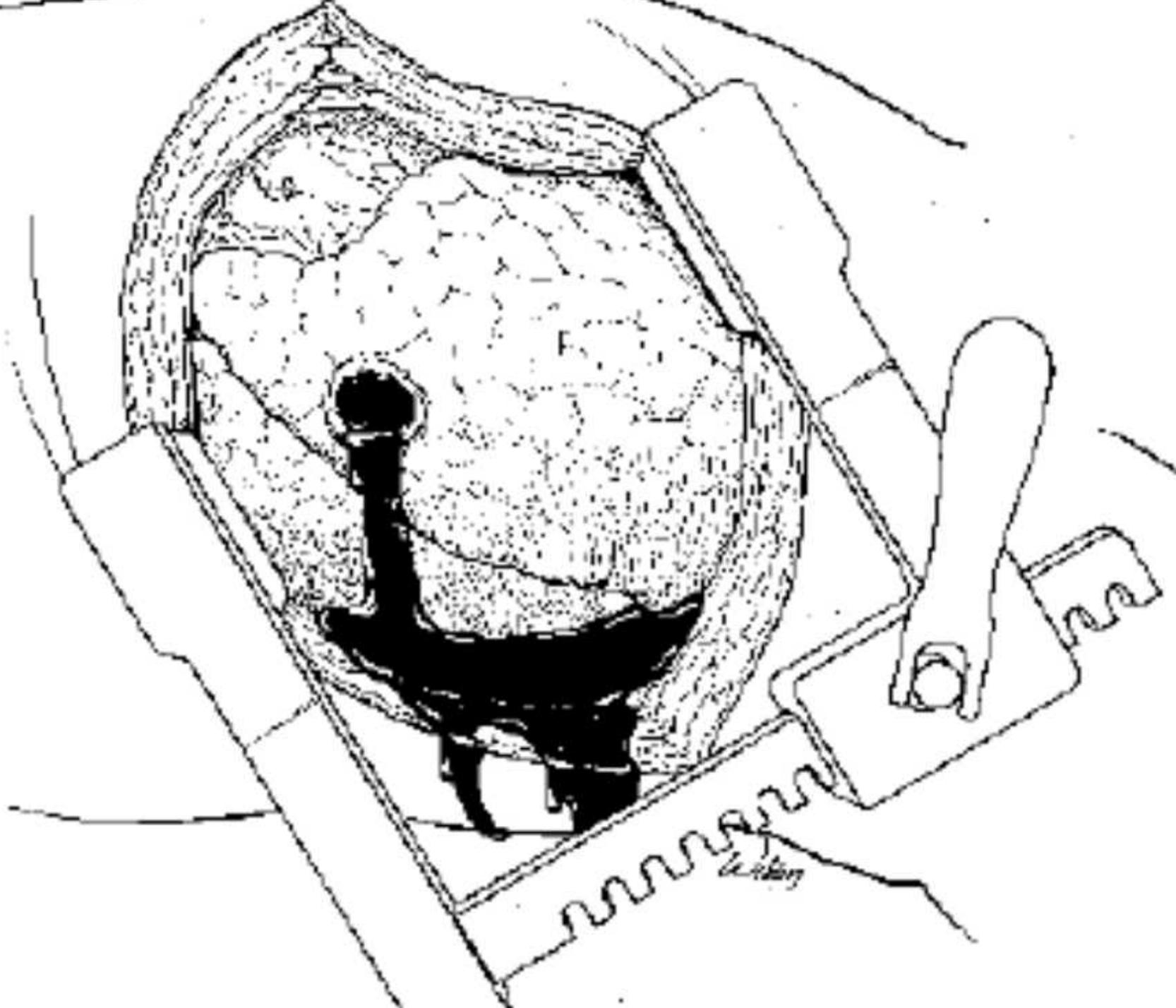
Emergency Department Thoracotomy - technika

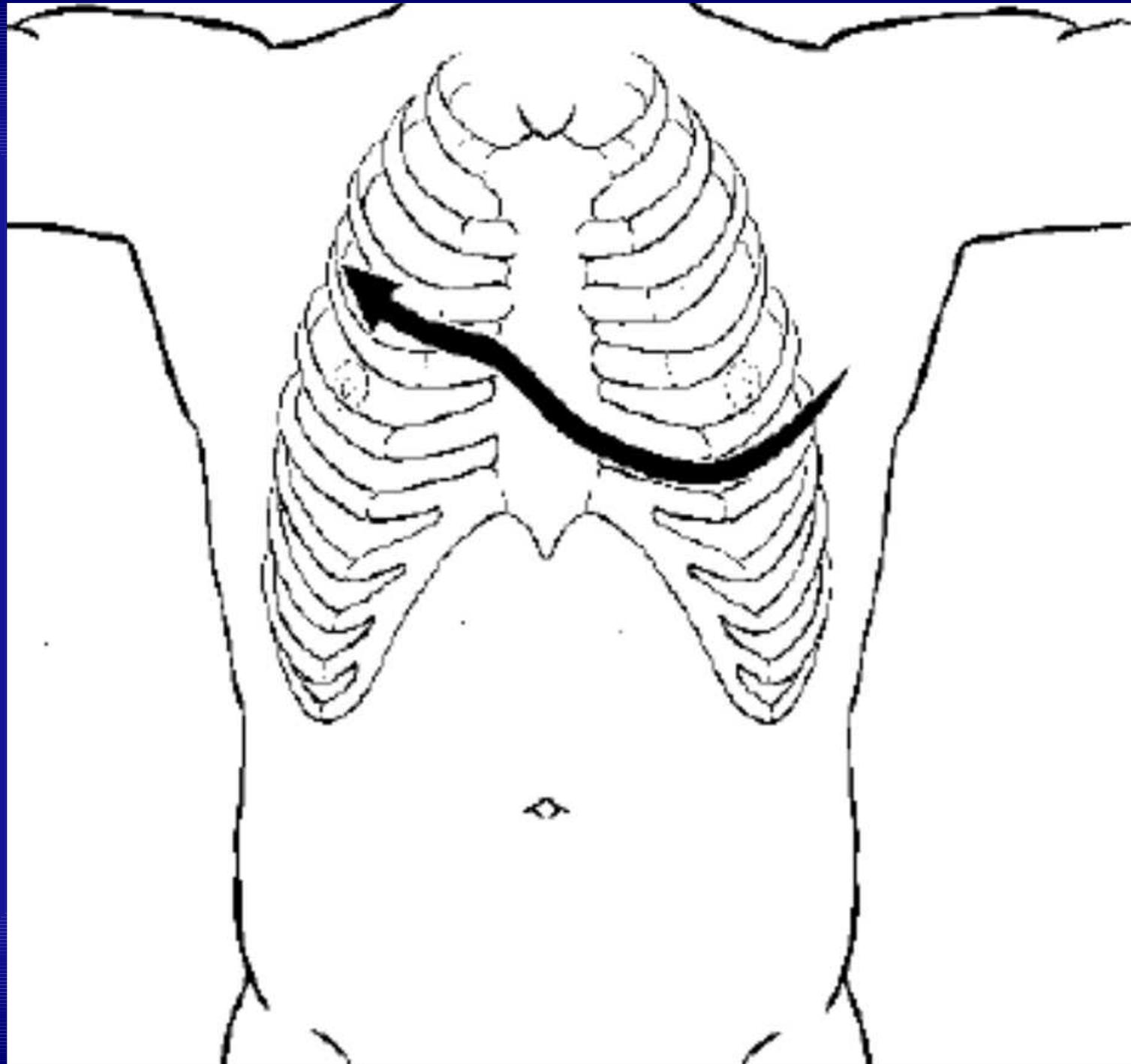
- Nutnost zkušeného chirurga
- Levostranná anterolaterální torakotomie – „od sterna k hraně stolu“ – v úrovni bradavky (baze prsu)
- Přerušlení dolního plicního ligamenta

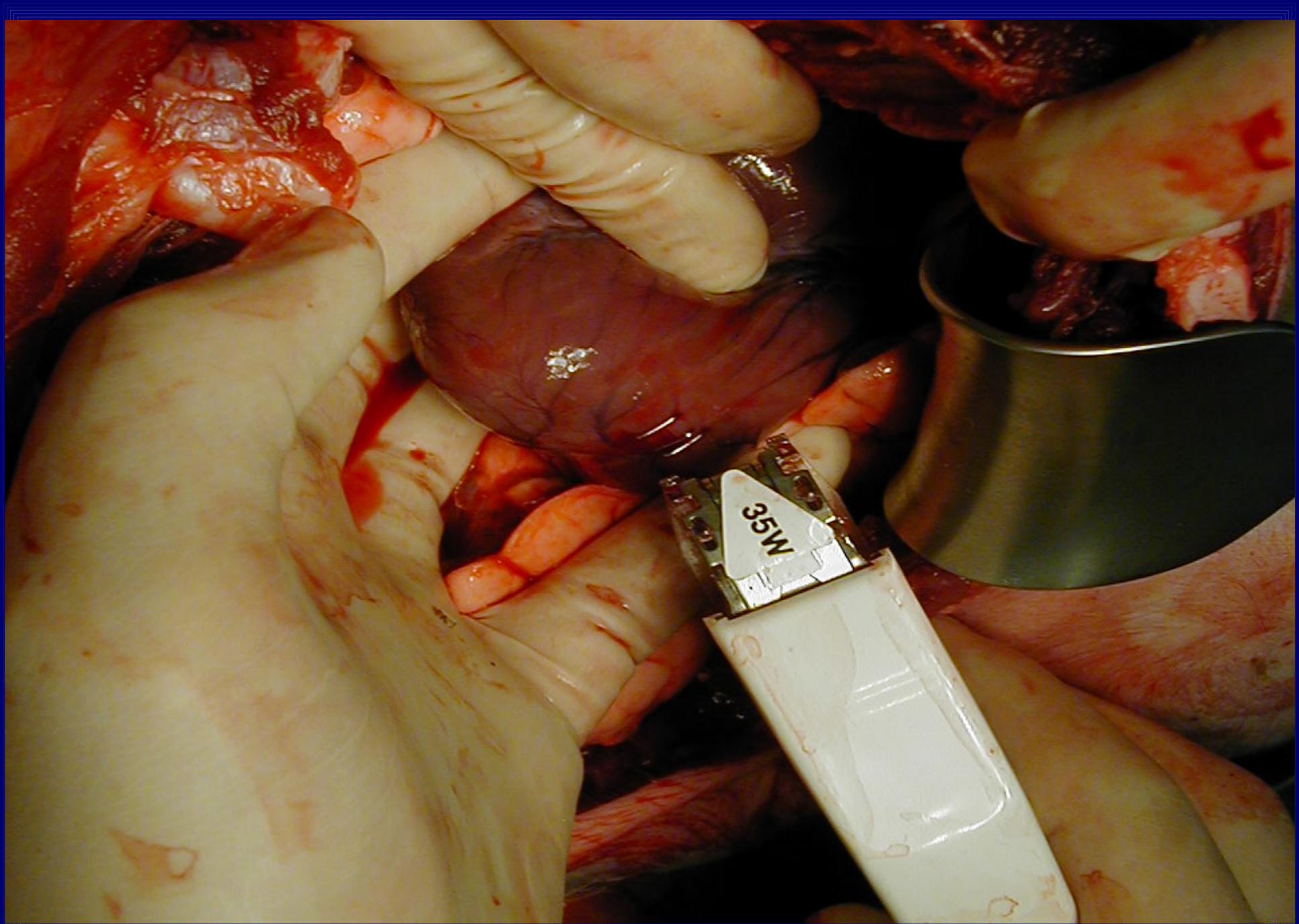
Emergency Department Thoracotomy - technika

- dekomprese perikardu s reparací srdce
- „twist“ plíce / klamp hilu plicního
- klamp hrudní aorty – doplnění volumu – další výkony
- možné rozšíření doprava - clamshell











Výsledky

Results: EDT had an overall survival rate of 7.4%. Normal neurologic outcomes were noted in 92.4% of surviving patients. Factors reported as influencing outcomes were the mechanism of injury (MOI), location of major injury (LOMI), and signs of life (SOL). Survival rates for MOI were 8.8% for penetrating injuries and 1.4% for blunt injuries. When penetrating injuries were further separated, the survival rates were 16.8% for stab wounds and 4.3% for gunshot wounds. For the LOMI, survival rates were 10.7% for thoracic injuries, 4.5% for abdominal injuries, and 0.7% for multiple injuries. If the LOMI was the heart, the survival rate was the highest at 19.4%. The third factor influencing outcomes was SOL. If SOL were present on arrival at the hospital, survival rate was 11.5% in contrast to 2.6% if none were present. SOL present during transport resulted in a survival rate of 8.9%. Absence of SOL in the field yielded a survival rate of 1.2%. There

Výsledky – Evropa 😊

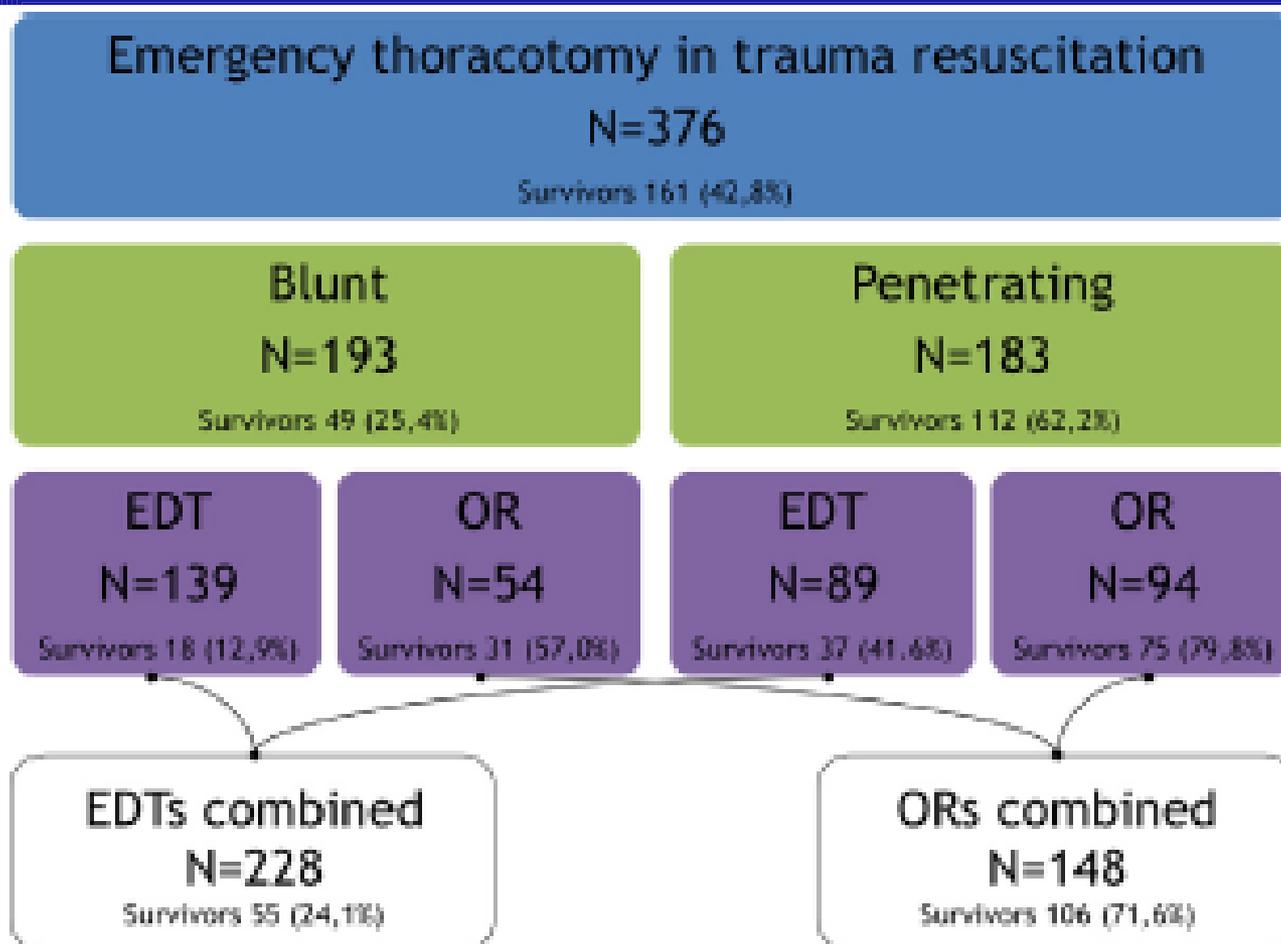


Fig. 2. Collective outcomes from ERT in European series.

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Rizika

- Forenzní ????
- Technické – neúčinný klamp, nemožnost zástavy krvácení

INFEKCE !!!



TAKE HOME MESSAGE(S)

Emergency department thoracotomy

- Logistika péče na ER – ATLS protokol
- Včasné rozpoznání traumatické zástavy oběhu
- Správná indikace výkonu
- **Včasný a rychlý chirurgický zákrok**

Emergency department thoracotomy

- Levostranná anterolaterální
- evakuace krve/klamp descendentní aorty
- zastavit krvácení/perikardiotomie
- packing – second look operace

Emergency department thoracotomy

- dělat jen to, co je opravdu potřeba
- operovat pro obnovu fyziologických funkcí
- anatomie počká
- umění včas ukončit operaci!!!!

DAMAGE CONTROL SURGERY - EDT

- Změna myšlení a chirurgického chování při urgencích z anatomického na fyziologické
- Snižuje forensní následky mé péče - dokumentace



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