Pelvik Travmalara Yaklaşım

Dr. Mehmet Arazi
Farabi Klinik
Konya

Sunum akışı:

- Pelvik travmanın tanımı ve önemi
- Pelvik hemoraji
- Hemodinamik instabilite
- Acil tedavi yaklaşımları
- Preperitoneal Pelvik Paketleme, C-Klemp, Endovasküler yaklaşımlar
- Özet

Pelvik travmalar:



Bize düşen!

- **<u>Hastayı yaşatmak!</u>**

(hemodinamik stabiliteyi sağlamak)

- **<u>Stabiliteyi sağlamak!</u>**

(pelvik simetri)





Pelvik travmalar:

Hemodinamik instabilite öldürür!

Pohlemann T et al. *Survival trends and predictors of mortality in severe pelvic trauma: Estimates from the German Pelvic Trauma Registry Initiative , Injury, May 2011.*

Mortalite oranları:

Table 2 Causes of Mortality at Specific Time Intervals in Pelvic Trauma Patients

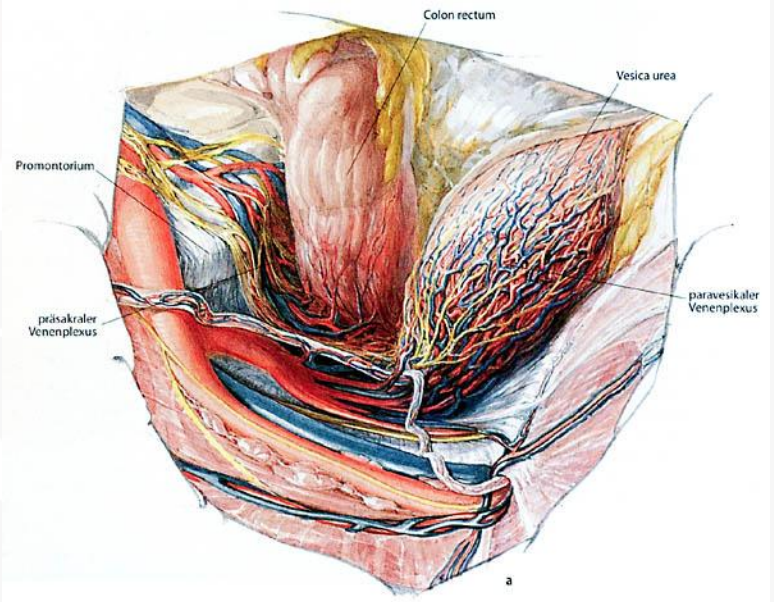
Hospital Arrival	Hemorrhage	Associated Injuries	Complications[a]
0–24 h	66 (74 %)	43 (48 %)	3 (3 %)
24–48 h	3 (60 %)	4 (80 %)	0 (0)
48–72 h	6 (86 %)	3 (43 %)	1 (14 %)
>72 h	1 (2 %)	35 (64 %)	48 (87 %)

0–24 h: including 24 h; 24–48 h: including 48 h, not including 24 h; 48–72 h: including 72 h, not including 48 h; [a]complications refer to in-hospital or trauma related complications as addressed in detail in Methods section

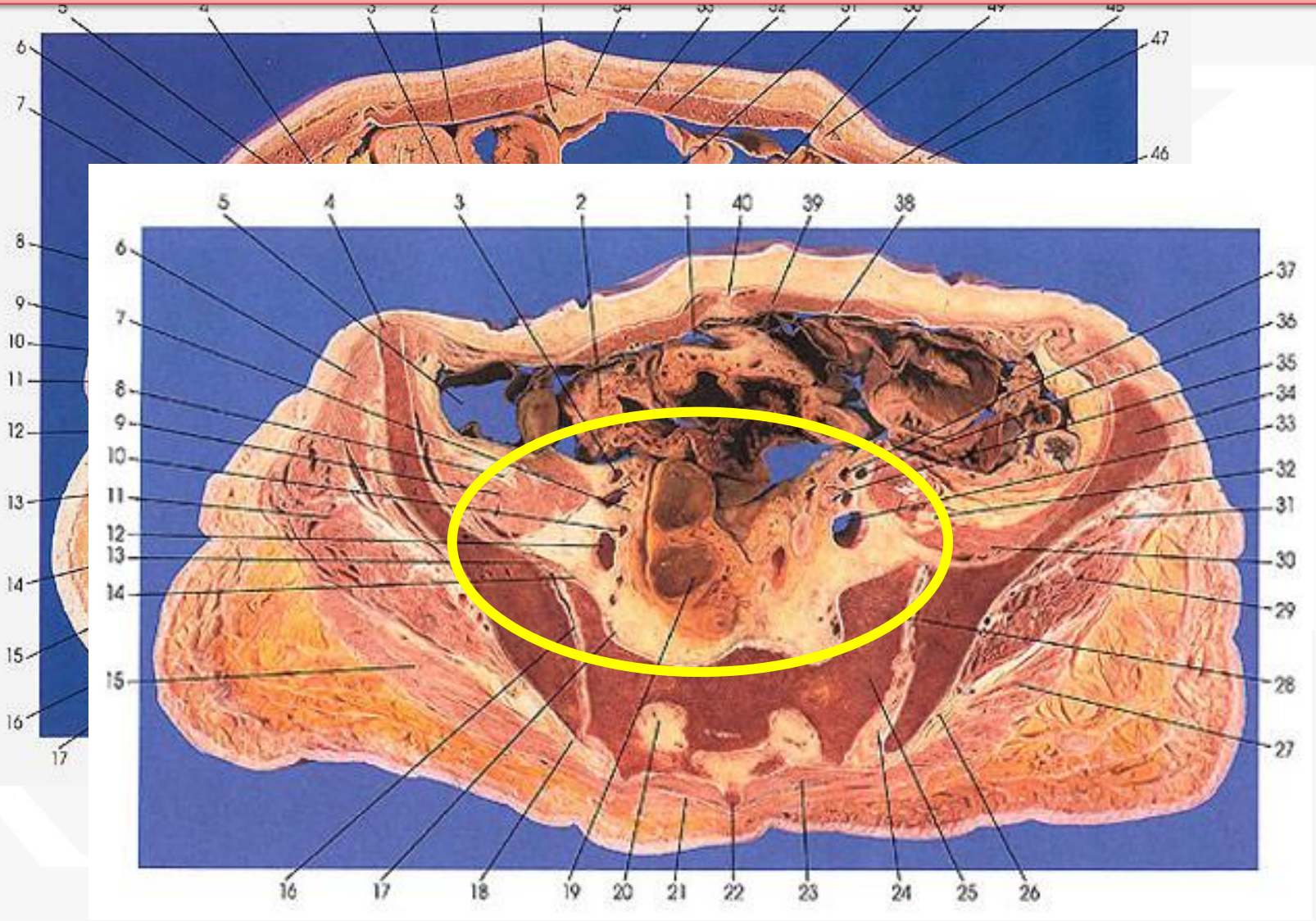
Pelvik hemoraji:

- 1. sıradaki ölüm nedeni
- Kaynak:
  - %80-90 venöz:
    - *Kırık hattı!*
    - Presakral venöz pleksus
    - Perivesikal venöz pleksus
  - %10-20 arteryel
- Retroperitoneal, 4 lt.ye varan!



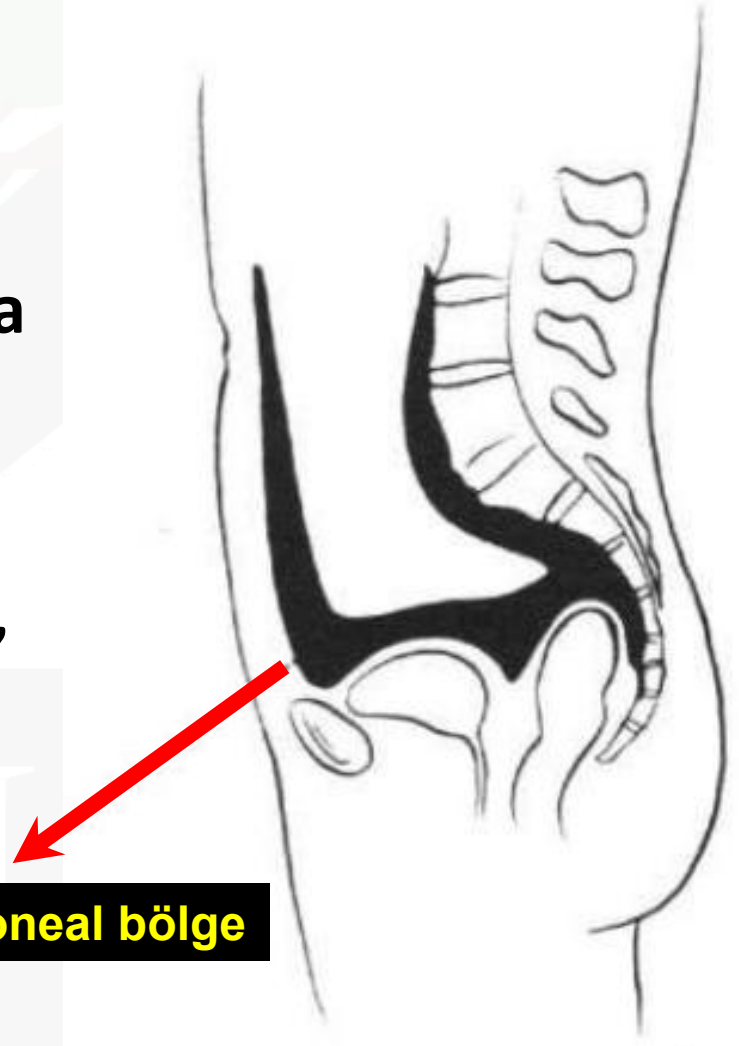


Pelvik hemoraji:



Retroperitoneal bölge:

- Üst sınır: diafram,
- Alt sınır: pelvik diafram
- Lateral : Q. Lumborum, 12. kosta ile birlikte.
- Ön sınır: paryetal periton
- Arka sınır: Psoas, Q. Lumborum, İliacus ve O. İnternus



Pelvik hemoraji:

- AP yaralanmalar arkadan kanar
- LK yaralanmaları önden kanarlar
- Radyolojik bulgular kanamayla ilgili olmayabilir
- İnternal rotasyon tehlikeli
- Pelvis manuple edilmez!

Hemodinamik instabilite:



- Kan basıncı <90 mmHg
- Nabız >100/dak.
- Şok indeksi >1
- Baz açığı, >6mmol/l (metabolik asidoz)
- 24 saatte 4-6 üniteden fazla kan/kan ürünü gerekliliği (arteryel kanama?)

Kötü prognoz belirleyiciler

- Bir cm.yi geçen:
  - Sakroiliak ayrılma
  - Pubik diastaz
  - Obturator forameni içine alan kırık
- 130'u geçen nabız
- Hipotansif sürecin uzaması
- Hematokritin 30'un altında olması

Clin Orthop Relat Res (2012) 470:2090–2097
DOI 10.1007/s11999-012-2276-9

Clinical Orthopaedics and Related Research®
A Publication of The Association of Bone and Joint Surgeons®

SYMPOSIUM: DISRUPTIONS OF THE PELVIC RING: AN UPDATE

What are Predictors of Mortality in Patients with Pelvic Fractures?

**Joerg H. Holstein MD, Ulf Culemann MD,
Tim Pohlemann MD, Working Group Mortality in Pelvic Fracture Patients**

Riskli hastalar:

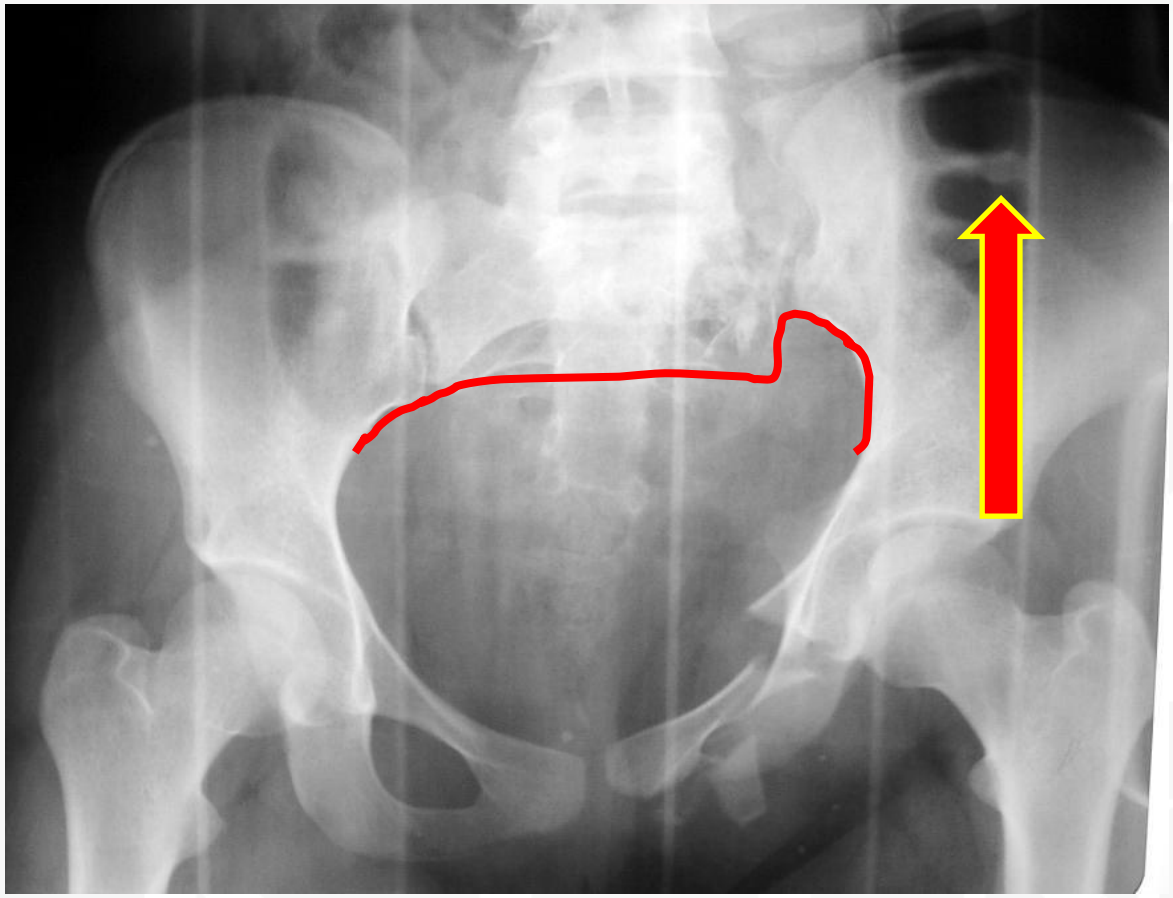
- Erkekler
- Multi travma hastaları

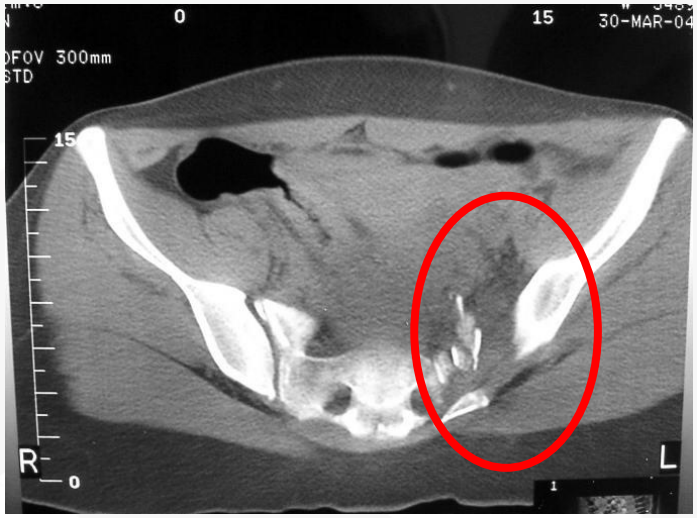
death, (2) demography, and (3) pattern and severity of injuries in patients with pelvic ring fractures who did not survive.

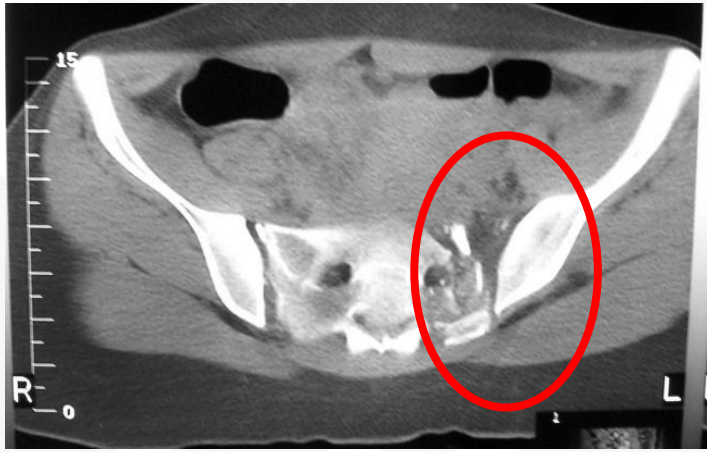
Methods We prospectively collected data on 5340 patients listed in the German Pelvic Trauma Registry between April 30, 2004 and July 29, 2011; 3034 of 5340 (57%) patients

Results A total of 238 (4%) patients died a median of 2 days after trauma. The main cause of death was massive bleeding (34%), predominantly from the pelvic region (62% of all patients who died because of massive bleeding). Fifty-six percent of nonsurvivors and 43% of survivors were male. Nonsurvivors were characterized by a higher incidence of complex pelvic injuries (32% versus 8%), less isolated pelvic

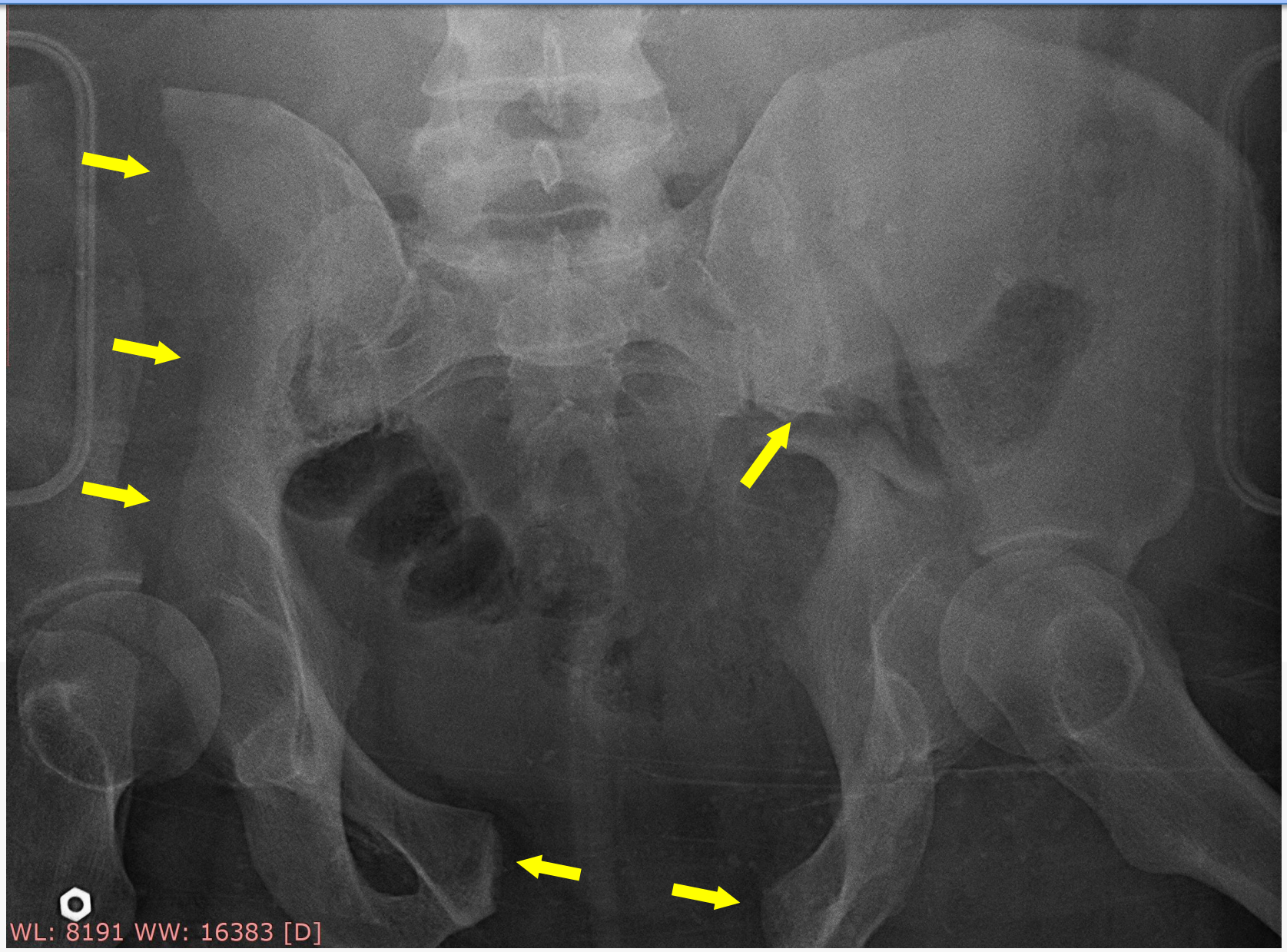
Çok kanayan kırıklar: Sakrum k.



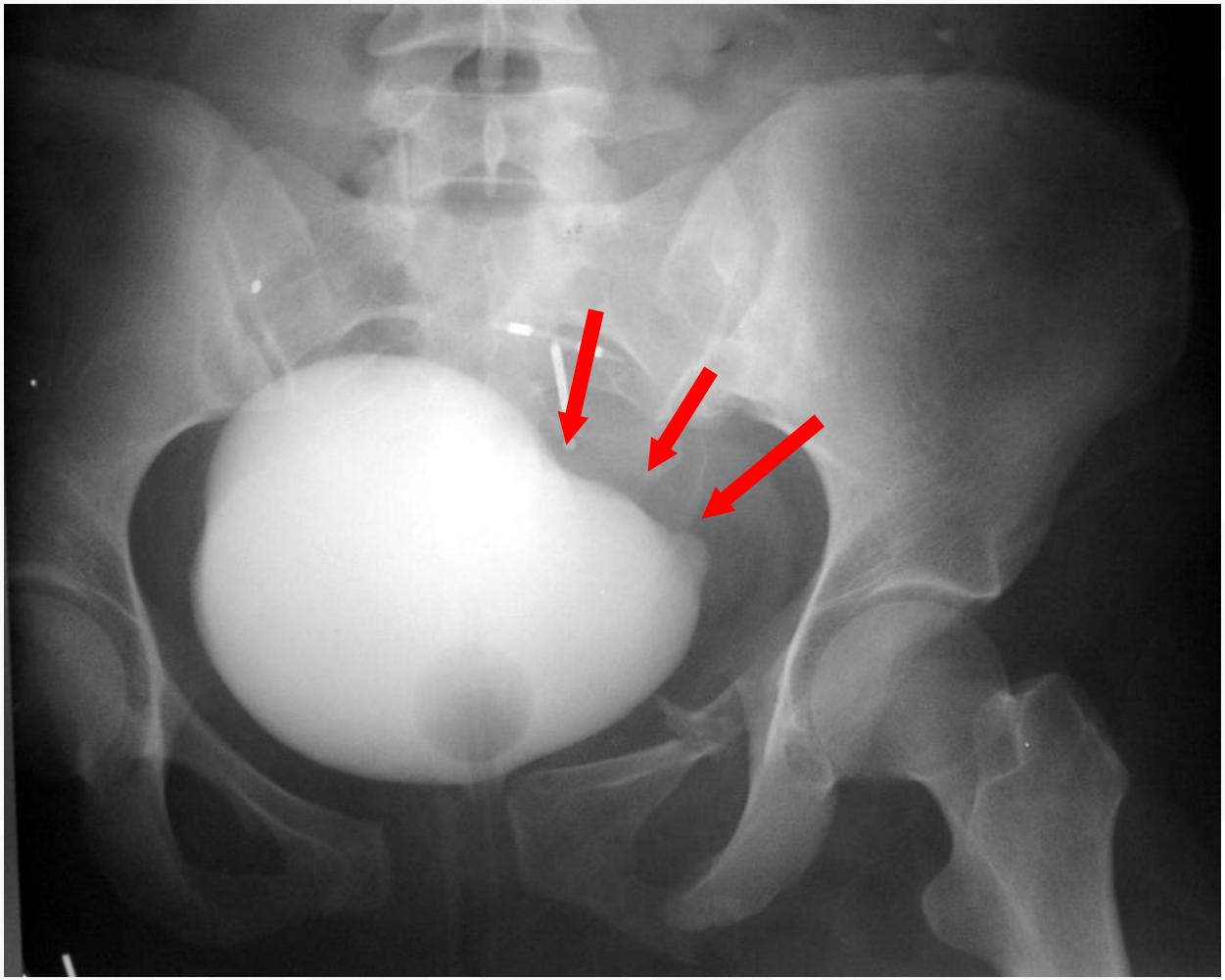




Çok kanayan kırıklar: Açık kitap



Çok kanayan kırıklar: Açık kitap



Sınıflama



- **Pennal**
- **Letournel**
- **Bucholz**
- **Young & Burgess**
- **Tile**
- **WSES:** *(World Society of Emergency Surgery)*

WSES Sınıflaması
(World Society of Emergency Surgery)

- **Hemodinamik durum ve Young & Burgess sınıflamasını vurgular:**
  - **Minör (WSES Grade I):**

    Hemodinamik ve Mekanik stabil
  - **Orta (WSES Grade II ve III):**

    Hemodinamik stabil, Mekanik anstabil
  - **Ciddi (WSES Grade IV):**

    Hemodinamik ve Mekanik olarak anstabil

Ölümcül pelvis kırığına yaklaşım

- **Ciddi (WSES Grade IV):** Hemodinamik ve Mekanik olarak anstabil
- **Hayat kurtarıcı girişim gerektiren yegane ortopedik yaralanma!**
- **Takım çalışması şart**
- **Algoritma**

Ölümcül pelvis kırığına yaklaşım

Kanamayı durdur!



Eksternal

İnternal

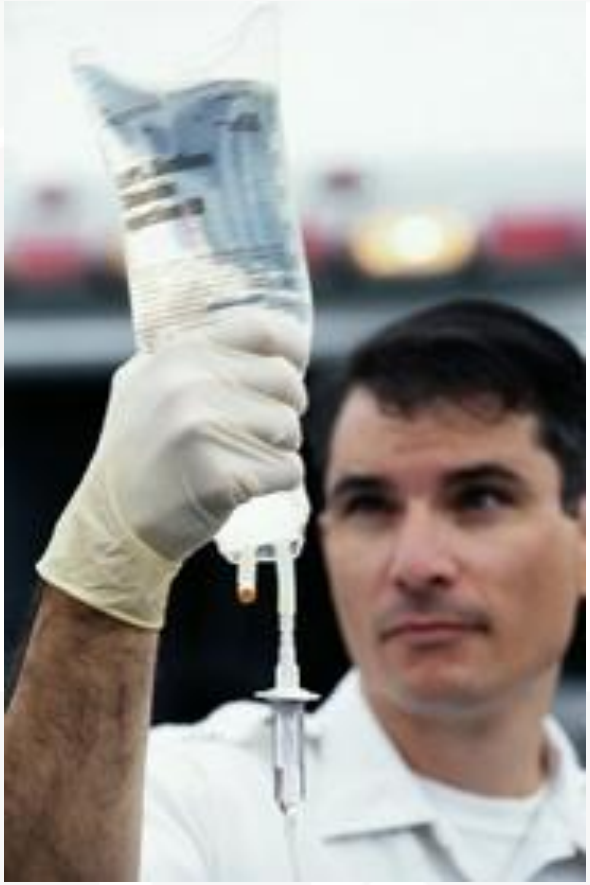
Hemodinamik instabilite tedavisi:

- ‘Mekanik tespit’ ve ‘kanama kontrolü’ esastır.
  - Eksternal fiksatör
  - C klemp (Ganzın C klempi)
  - Preperitoneal Pelvik Paketleme (PPP)
  - Akut internal tespit (perkütan pelvik vidalama)
  - Anjiografik Embolizasyon

HD instabil kanamalı hastanın yeri ameliyathanedir!

Tıbbi tedavi

- Sıcak tut
- Geniş IV kanüller
- Sıvı ve kan tedavisi
- Açık yaraların tedavisi



Noninvaziv pelvik tespit



Noninvaziv pelvik tespit: *Çarşaf ve klemp*

Routt. M.J.C. Et al, JOT, 2002



Noninvaziv pelvik tespit: *Çarşaf ve klemp*

Routt. M.J.C. Et al, JOT, 2002

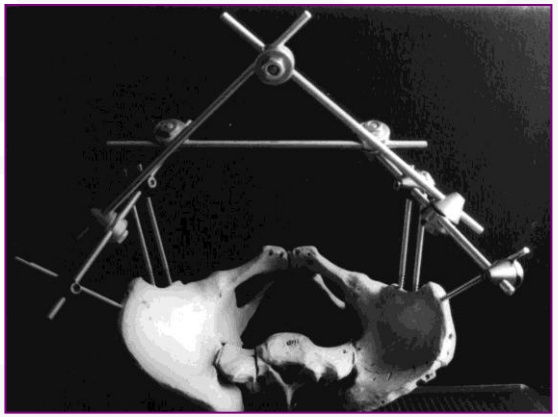


Pelvik eksternal fiksatör

- Venöz kanamaları kontrol eder
- Hayat kurtarıcı
- Pelvik hacmi d
- ARİF'a dönülebilir



20-30 dk. içerisinde uygulanmalı!

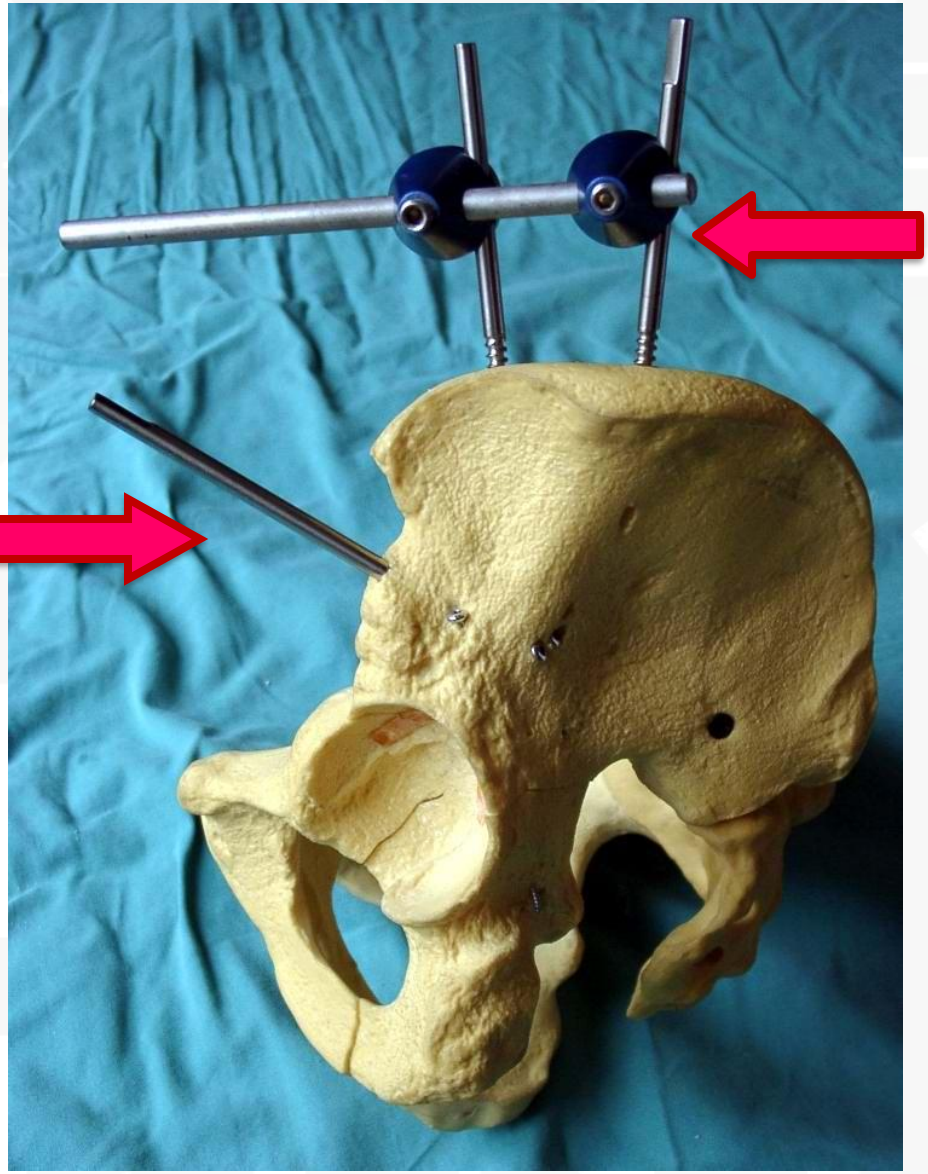


Uygulama tekniği: *Çivi yerleştirme yeri*

- En sık superior
- İnferior (supraasetabular)

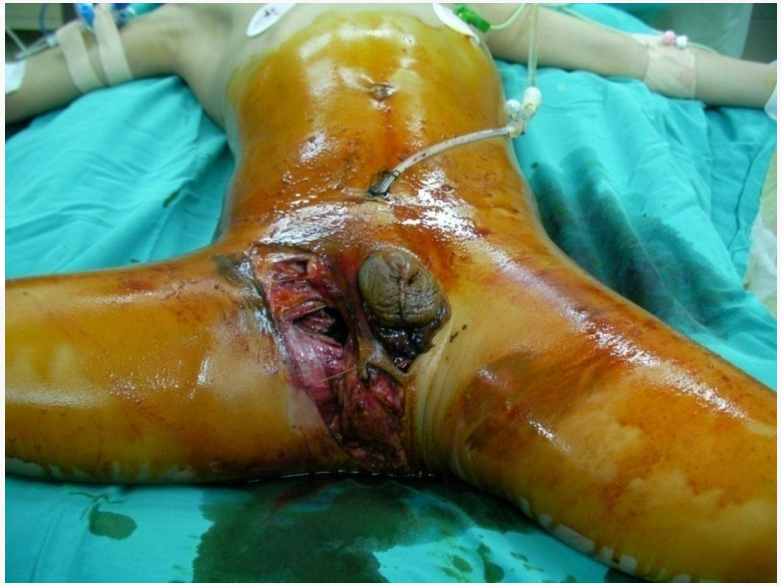
  daha stabil
- Abdomen bakımı kolay
- ***Son yıllarda populer!..***




süperior
inferior

Açık pelvis kırıkları:

- %25-50 mortal
- Rektal veya vajinal penetrasyon
- Pelvik tamponad kaybolur
- Kolostomi, eks- fiks.

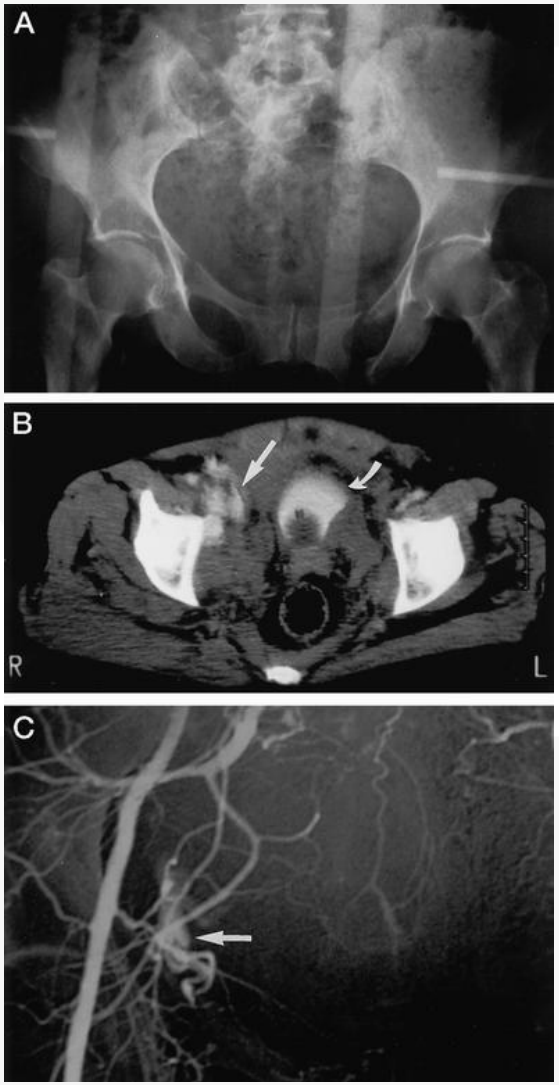


Açık pelvis kırıkları:



Anjiyografik Embolizasyon

- ABD’de yaygın
- Arteriel kanamayı durdurur, tamponad oluşumuna yardımcı olur
- Hastaların yaklaşık %3-10 gerekir
- Transfer sorunu
- Acil cerrahi gereken hastalarda zaman kaybı



Preperitoneal Pelvik Paketleme: PPP

- Avrupa (Almanya)
- Anjiografiye alternatif?
- Hemodinamik instabilitede etkili bir alternatif (%80)
- Orijinal olarak:
  - Hannover'de Tim Pohlemann et al. (1995)
  - Zurich'de Ertel et al. (2001)
- Anjiografinin mümkün olmadığı yerde PPP hayat kurtarıcı!



Tim Pohlemann , MD



Wolfgang Ertel, MD

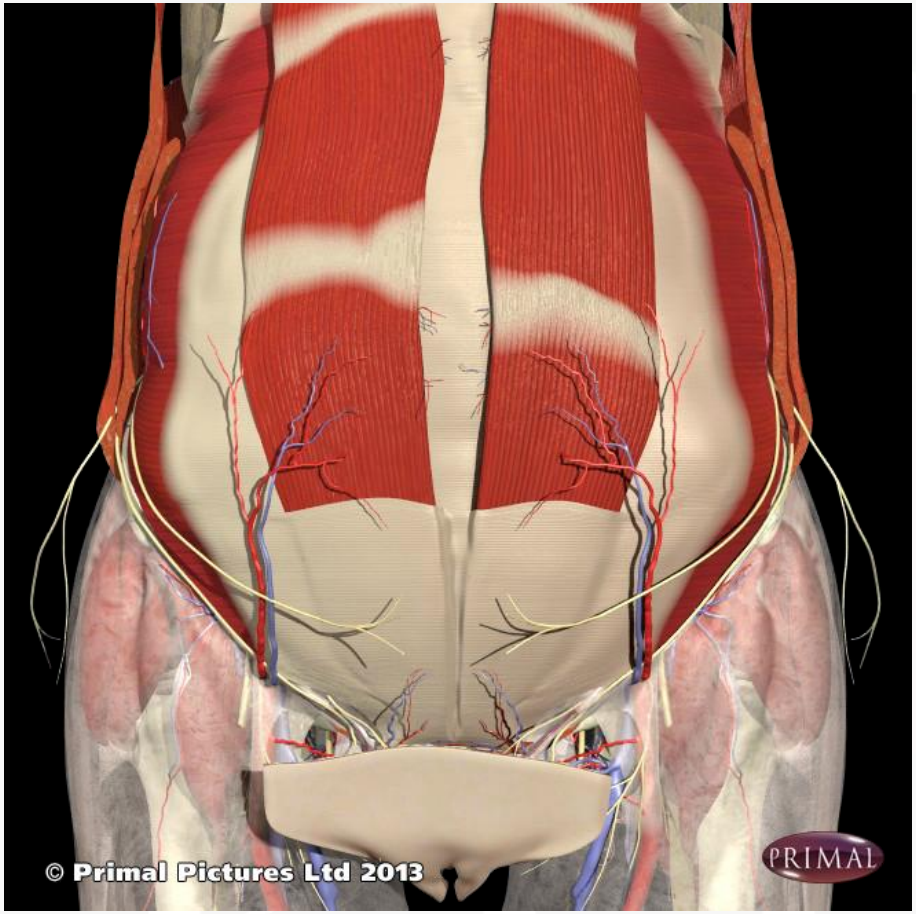
PPP: Endikasyonlar

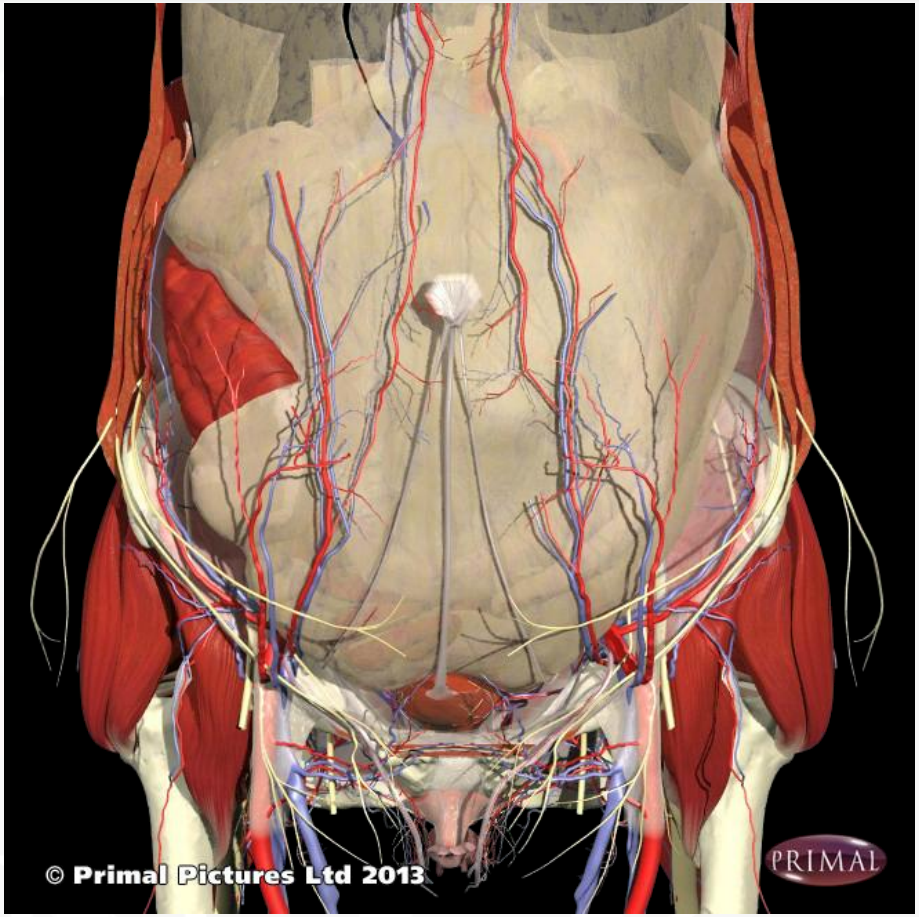
- HD instabil hasta
- 2 Ünite kan verilmesine rağmen TA<90 mm-Hg
- PPP ve laparotomiden önce mutlaka önce pelvis fikse edilmelidir!
  - C-Klemp
  - Eks-fiks

PPP: Hızlı ve kolay uygulanabilir bir yöntemdir!



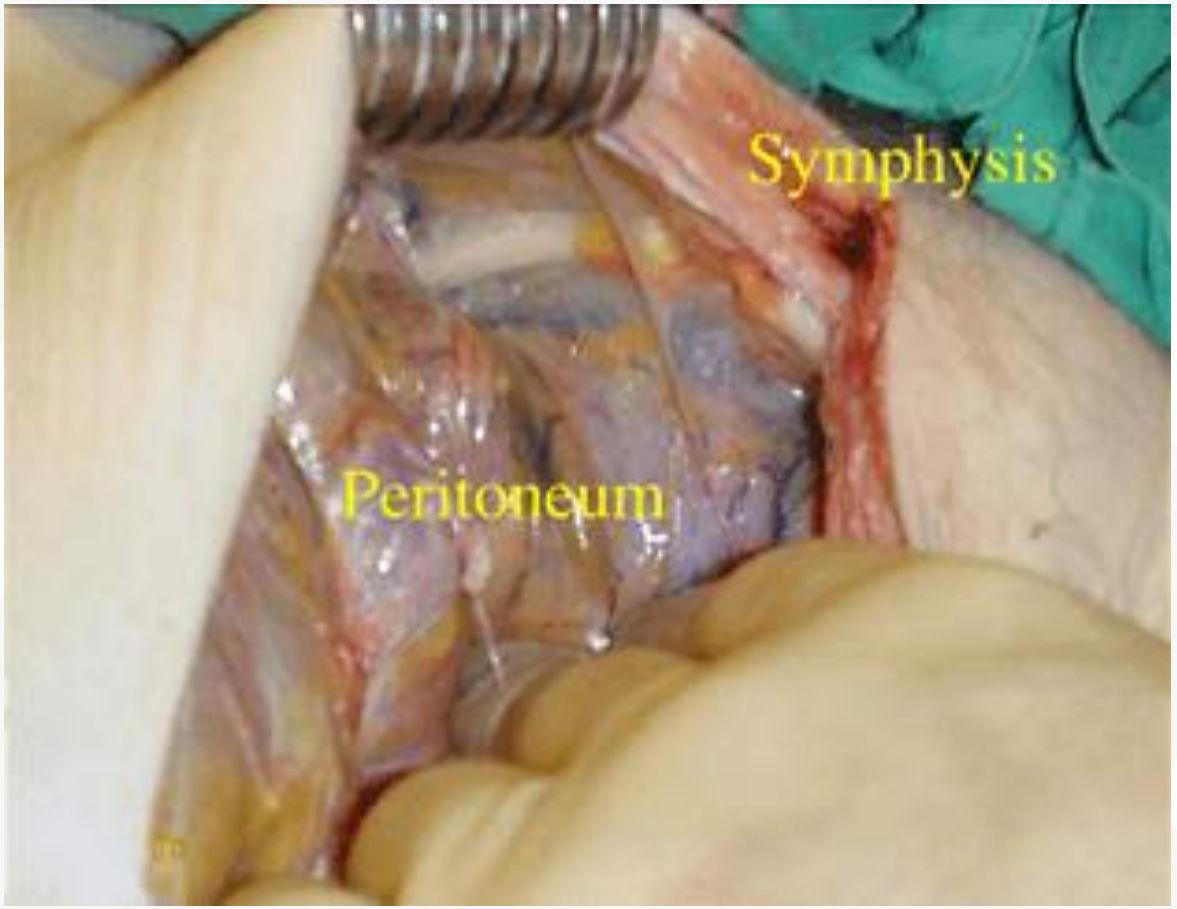
PPP: Teknik


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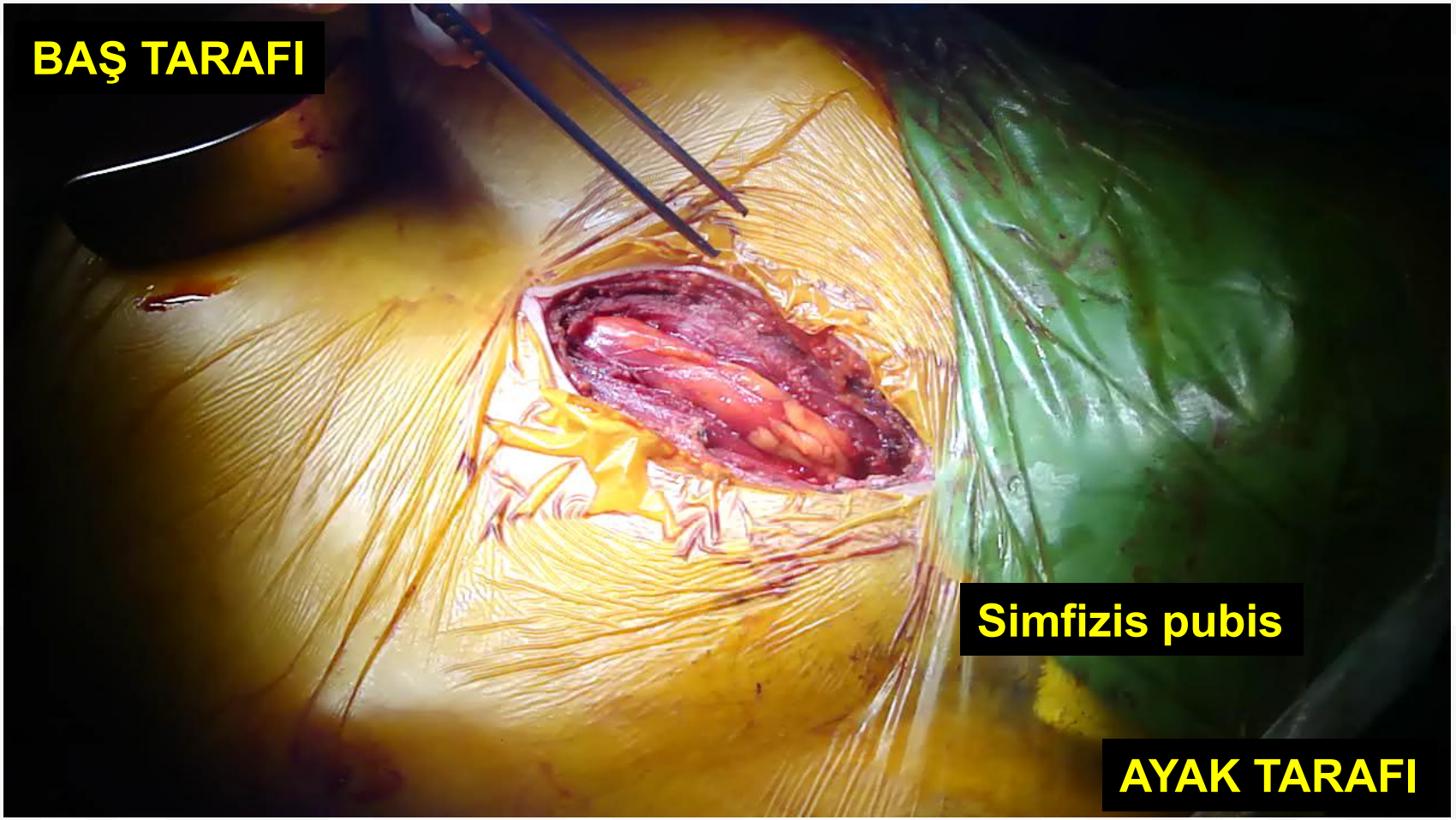

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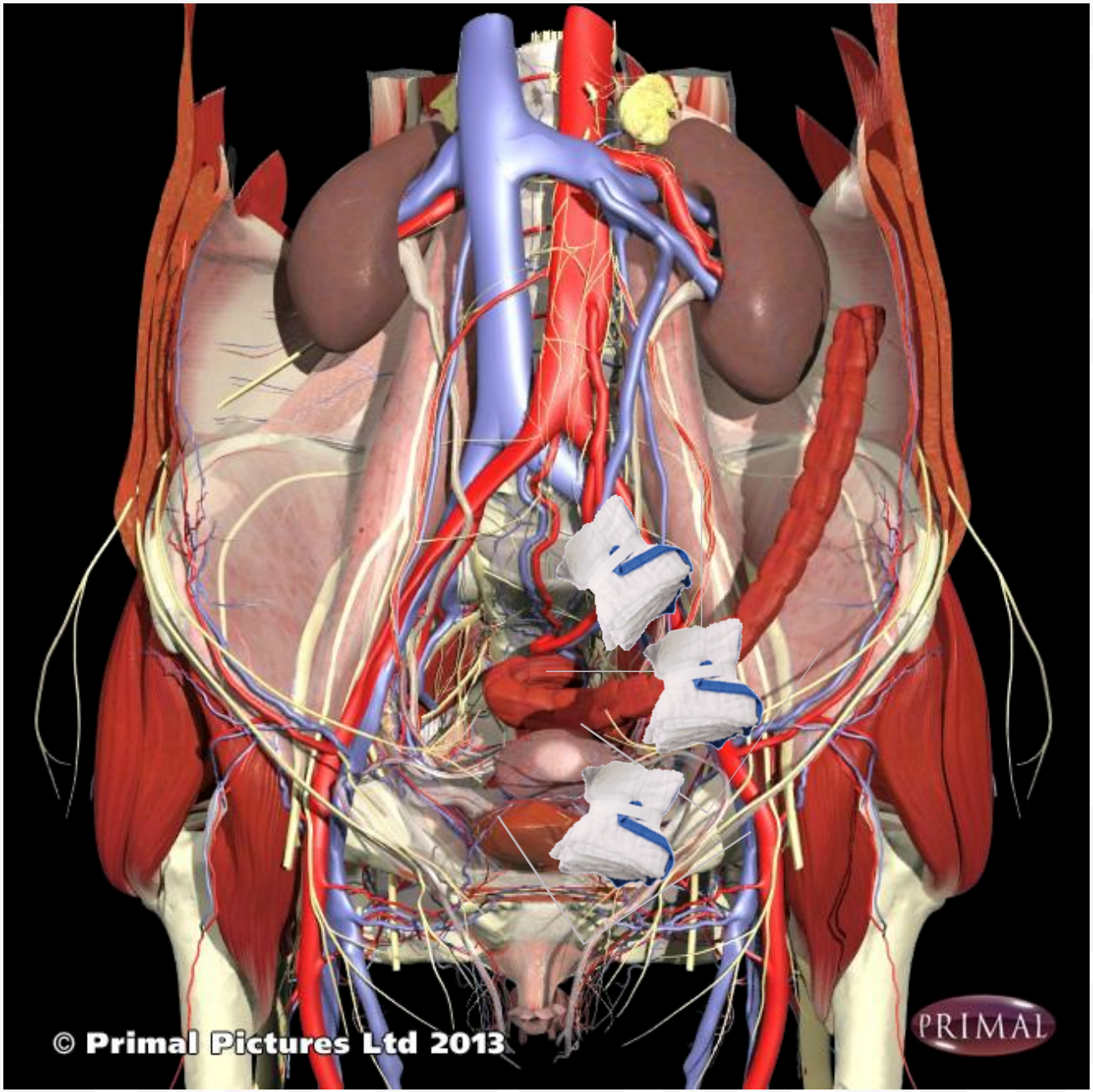
PPP: Teknik

- **Retroperitoneal bölgeye ulaşılır**



PPP: Teknik

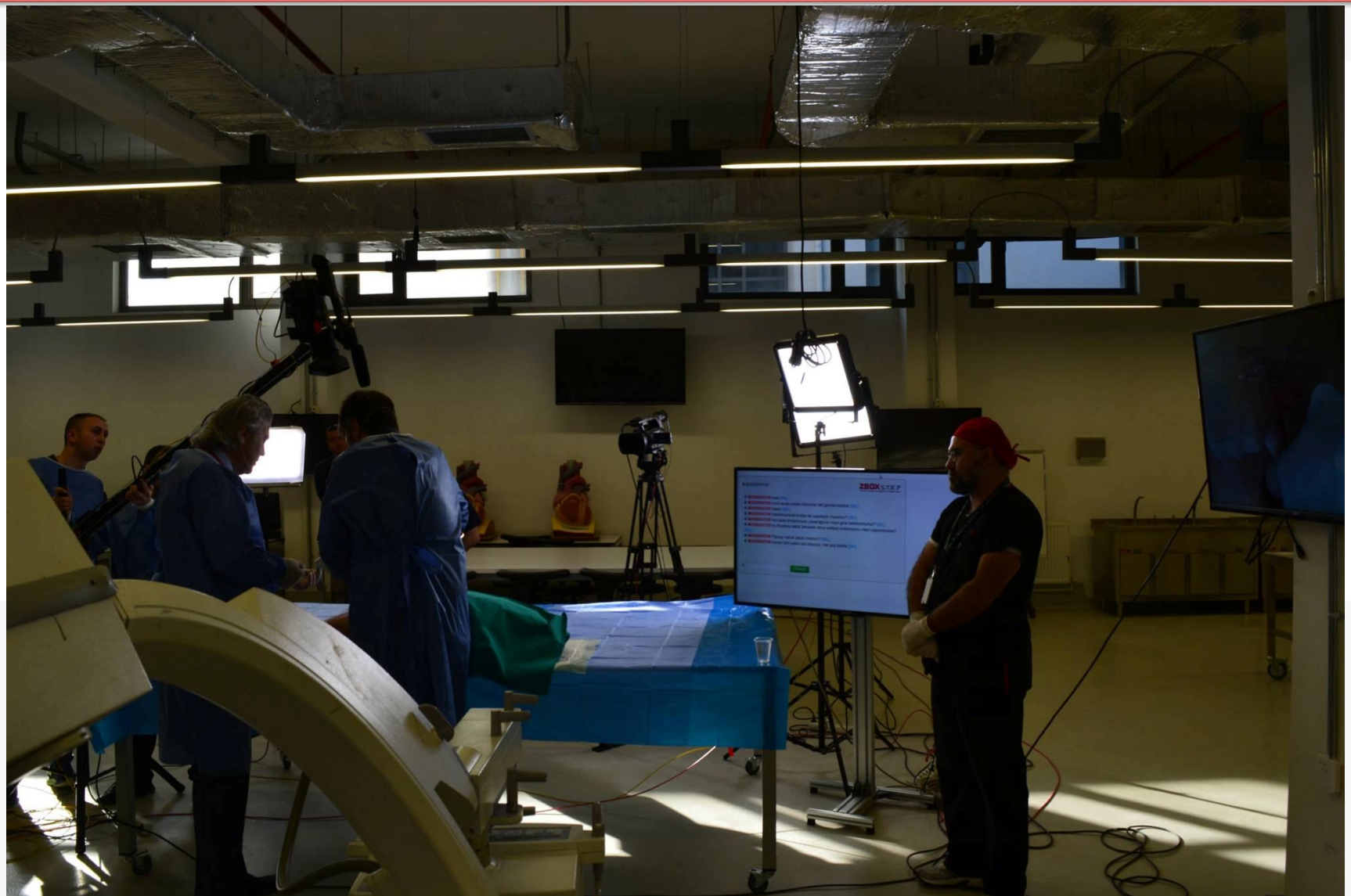



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Politravma Kursu, Kasım 2016



Politravma Kursu, Kasım 2016



Literatür?

Journal of Orthopaedic Trauma
Vol. 15, No. 7, pp. 468–474
© 2001 Lippincott Williams & Wilkins, Inc., Philadelphia

Control of Severe Hemorrhage Using C-Clamp and Pelvic Packing in Multiply Injured Patients With Pelvic Ring Disruption

Wolfgang Ertel, Marius Keel, Karim Eid, Andreas Platz, and Otmar Trentz

Division of Trauma Surgery, University Hospital Zurich, Zurich, Switzerland

Objectives: Evaluation of diagnostic and therapeutic workup in multiply injured patients with pelvic ring disruption and hemorrhagic shock.
Design: Prospective study.
Patients: Twenty consecutive multiply injured patients (ISS: 41.2 ± 15.3 points) with pelvic ring disruption and hemorrhagic shock.
Intervention: A C-clamp was used for primary stabilization of the pelvic ring instability. In patients with persistent or massive hemorrhage, laparotomy and pelvic packing were performed. Consecutive measurements of blood lactate levels during the early period after injury.
Main Outcome Measurements: Lactate, mortality.
Results: A C-clamp was applied in all patients within 57.4 ± 30.6 minutes of arrival. Fourteen patients underwent laparotomy with pelvic packing for control of hemorrhage, three patients additional resuscitation thoracotomy (aortic clamping: $n = 2$). Four patients died of exsanguinating hemorrhage during the first 5.4 ± 3.3 hours from arrival, one patient because of septic multi-organ failure twenty-three days after injury (total mortality: 5/20; 25 percent). Lactate levels at admission were elevated in all patients (5.1 ± 2.6 mmol/l). Increased blood lactate levels (4.8 ± 1.7 mmol/l) (+71 percent; $p < 0.05$) were observed in survivors undergoing laparotomy compared with survivors without laparotomy (2.8 ± 1.1 mmol/l). In contrast, hemoglobin (7.0 ± 2.6 g/dl versus 7.9 ± 2.2 g/dl) and hematocrit (21.4 ± 6.4 percent versus 23.2 ± 6.8 percent) were similar in both groups. In patients who died during the first hours after admission, lactate levels were elevated (8.6 ± 2.5 mmol/l) compared with survivors (4.2 ± 1.8 mmol/l) and increased further.
Conclusions: Sequential measurements of blood lactate levels during the early period after injury may provide a more rapid and reliable estimation of true severity of hemorrhage than routinely used parameters. Pelvic packing in addition to pelvic ring fixation with a C-clamp allows for effective control of severe hemorrhage in multiply injured patients with pelvic ring disruption.
Key Words: Pelvic injury, Hemorrhage, Diagnostics, Lactate, Therapeutic, External fixation, C-clamp.

The incidence of pelvic trauma increased over the last decade because of a rising number of high-speed acci- bleeding represents a serious problem in those patients and is the crucial hallmark for survival during the early



Wolfgang Ertel, MD

Literatür?

The Journal of TRAUMA® Injury, Infection, and Critical Care

Preperitonal Pelvic Packing for Hemodynamically Unstable Pelvic Fractures: A Paradigm Shift

C. Clay Cothren, MD, Patrick M. Osborn, MD, Ernest E. Moore, MD, Steven J. Morgan, MD, Jeffrey L. Johnson, MD, and Wade R. Smith, MD



PPP bu hastaların tedavisinde bir devrimdir!

Background: The current management of pelvic fracture patients who are hemodynamically unstable in the United States consists of aggressive resuscitation, fixation, according to our protocol. Statistics are reported as mean ± SEM and analyzed using Student's *t* test.

Results: During the study period, 28 nificantly different (12 ± 2.0 versus 6 ± 1.1; $p = 0.006$). The first 4 patients underwent routine angiography postPPP, with 1 undergoing therapeutic embolization; 4 of

mortality.

Methods: Since September 2004, all patients at our ACS-verified level I trauma center with hemodynamic instability and pelvic fractures underwent PPP/external (PRBCs) during 82 ± 13 minutes in the ED. Blood transfusion requirements before postoperative surgical intensive care unit (SICU) admission compared with the subsequent 24 postoperative hours were sig- after PPP, and this approach appears to reduce mortality in this select high-risk group of patients.

Key Words: Trauma, Pelvic fracture, Preperitoneal pelvic packing, Hemorrhage.

J Trauma. 2007;62:834–842.

Pelvic fracture patients who are hemodynamically unstable are a diagnostic and therapeutic challenge for the by appropriate interventional radiology access and embolization may consume hours while the patient remains hemodynamically

Preperitoneal pelvic packing reduces mortality in patients with life-threatening hemorrhage due to unstable pelvic fractures

Burlew, Clay Cothren MD; Moore, Ernest E. MD; Stahel, Philip F. MD; Geddes, Andrea E.; Wagenaar, Amy E.; Pieracci, Fredric M. MD; Fox, Charles J. MD; Campion, Eric M. MD; Johnson, Jeffrey L. MD; Mauffrey, Cyril MD

Journal of Trauma and Acute Care Surgery: February 2017 - Volume 82 - Issue 2 - p 233–242
doi: 10.1097/TA.0000000000001324
AAST 2016 Plenary Papers

EDITOR'S CHOICE

Kan takviyesine rağmen kanama kontrol edilemiyorsa, PPP uygulanmalıdır!

pelvic fracture patients in shock. Angioembolization (AE) is the most common intervention; the Maryland group revealed time to AE averaged 5 hours. The goal of this study was to evaluate the time to intervention and outcomes of an alternative approach for pelvic hemorrhage. We hypothesized that preperitoneal pelvic packing (PPP) results in a shorter time to intervention and lower mortality.

METHODS: In 2004, we initiated a PPP protocol for pelvic fracture hemorrhage.

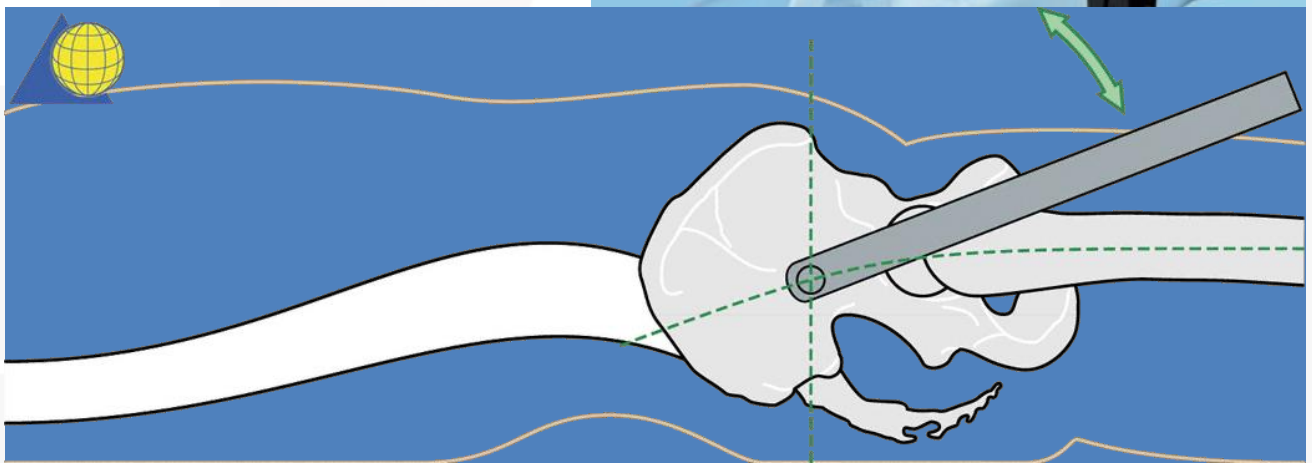
RESULTS: During the 11-year study, 2,293 patients were admitted with pelvic fractures; 128 (6%) patients underwent PPP (mean age, 44 ± 2 years; Injury Sev

The Journal of Trauma and Acute Care Surgery

Antişok C-Klemp uygulaması

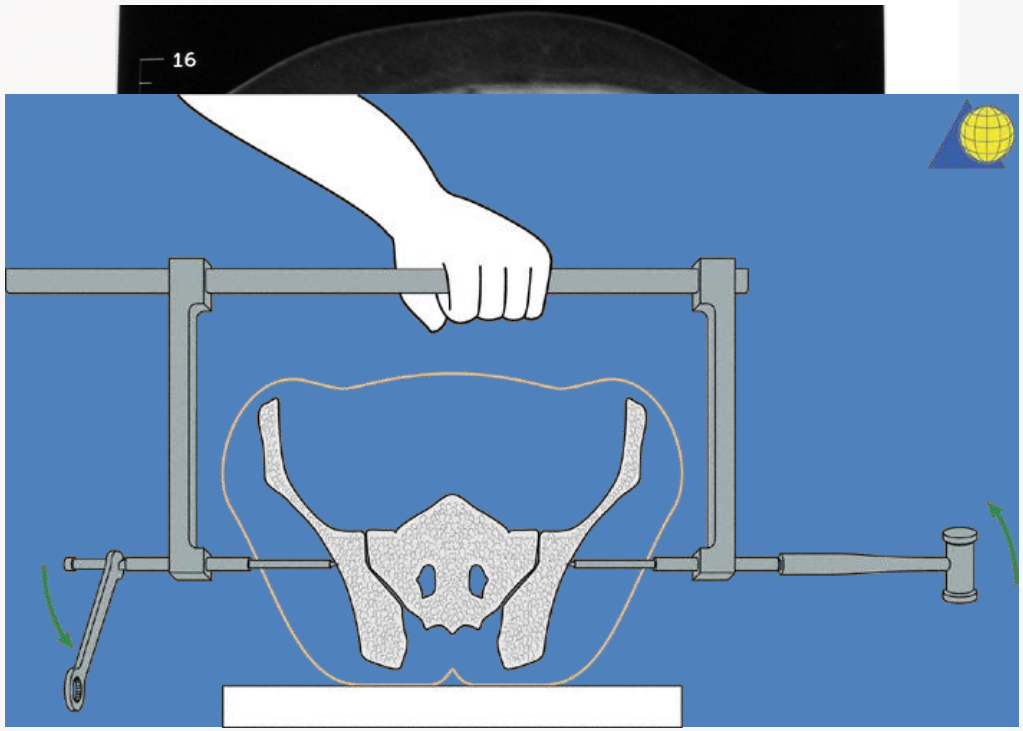
- PPP ile birlikte oldukça etkin
- Pelvik hacimi daraltır
- Uygulama tekniği ve komplikasyonlarına dikkat!





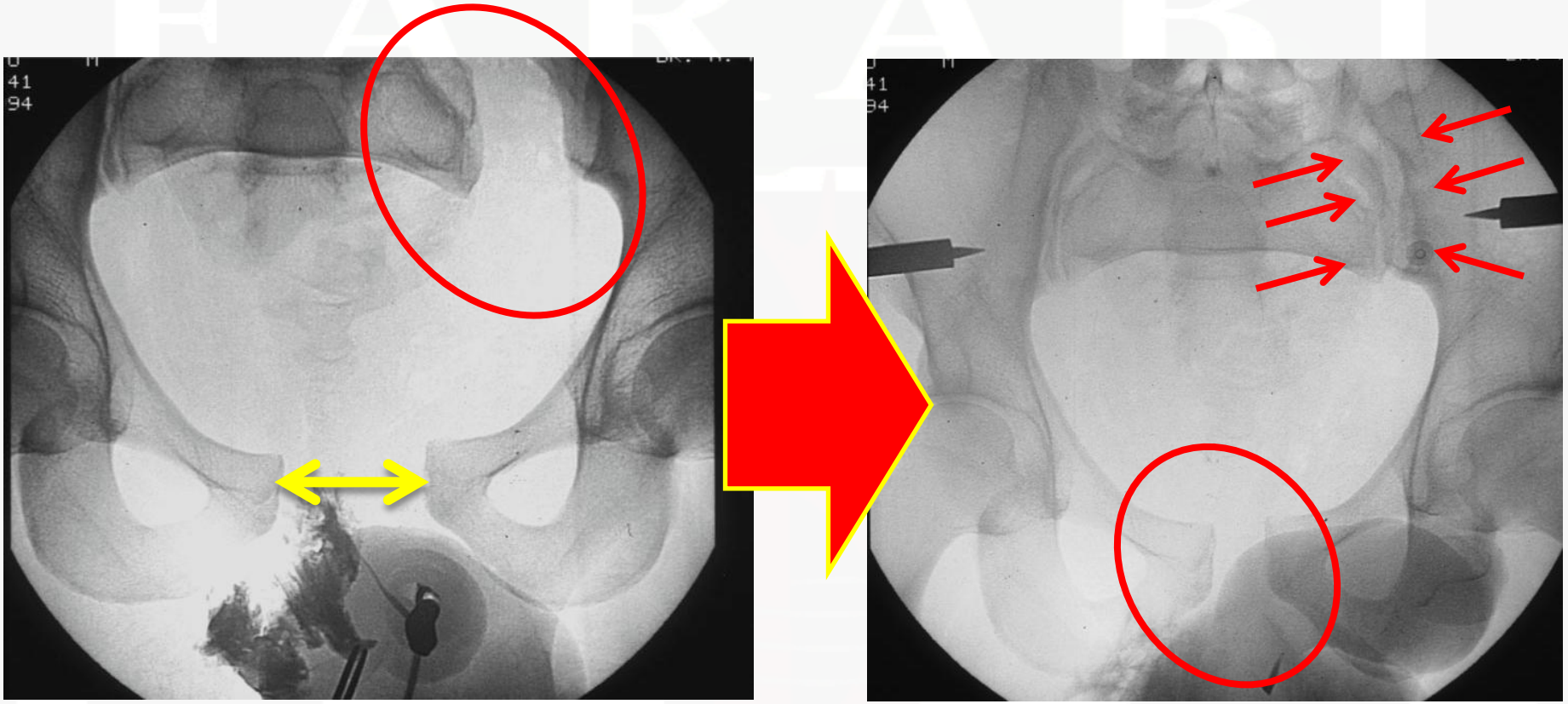
C-Klemp: Anatomik özellikler

- İliak kanat dışyanında hafif çıkıntı üzerinden
- Skopi altında kolay bulunur



Endikasyon ve kontrendikasyonlar

- **Ana endikasyon: Hemodinamik instabil Tip C pelvis kırığı (Sİ ayrılma, sakrum kırığı)**
- **Kontrendikasyonlar:**
  - **İlium içi kırıklar**
  - **Transiliak kırıklı çıkıklar**
  - **Tip C hemodinamik stabil kırıklar**



OTA web sayfasından alınmıştır

REBOA

- Aortun endovasküler geçici okluzyonu
- Henüz yeni
- Extremis hastalara saklanmalı, kalıcı tedaviye kadar kısa süreli uygulanmalı
- Etkili olduğuna ve mortaliteyi azalttığına dair güçlü kanıtlar yok, ileri çalışmalar gerekli

Ahmed and Kuo *BMC Emergency Medicine* (2024) 24:104
https://doi.org/10.1186/s12873-024-01020-y

BMC Emergency Medicine

RESEARCH Open Access

Resuscitati Occlusion in Hemorr Pelvic Frac

Nasim Ahmed[1,2*] and Ye

Abstract

Background The purpo cular Balloon Occlusion

Methods The Americar endar years 2017–2019 sustained severe pelvic f sented with the lowest s from the study. Propensi acteristics to patients wh

Results Out of 3,186 pa rhagic shock with severe ysis showed no significa REBOA regarding patien assessment and laparotc in overall in-hospital mo

Conclusion Our study shock associated with se A larger sample size pros

Case–control retrospe

Keywords REBOA, Hem

Zone 3 REBOA Use in Hypotensive Patients With Blunt Pelvic Trauma Requiring Hemorrhage Control Surgery: A National Retrospective Cohort Study

Herbert Downton-Ramos, MD, Aulon Jerliu, MD, [...], and Daniel Ricaurte, MD +2 View all authors and affiliations

OnlineFirst | https://doi.org/10.1177/00031348251378907

Contents | Get access | Cite | Share options | Information, rights and permissions | Metrics and citations

Abstract

Background

Resuscitative endovascular balloon occlusion of the aorta (REBOA) is increasingly used for hemorrhage control in trauma patients, yet its role in blunt pelvic trauma remains controversial. This study evaluates outcomes in hypotensive patients with blunt pelvic trauma undergoing hemorrhage control surgery, comparing those who received zone 3 REBOA to those who did not.

Methods

A retrospective cohort analysis was conducted using the ACS Trauma Quality Programs Participant Use File (TQP-PUF) from 2016 to 2019. Adult patients (≥18 years) with hypotension (SBP <100 mmHg) and blunt pelvic trauma who underwent surgical hemorrhage control were included. Exclusion criteria included traumatic brain injury, preperitoneal packing, resuscitative thoracotomy/sternotomy, and bleeding diatheses. Propensity score matching (1:1) was used to compare patients who received zone 3 REBOA versus those who did not. Primary outcomes were 24-hour and in-hospital mortality. Secondary outcomes included transfusion volume, acute kidney injury (AKI), and lower extremity amputation.

Results

Of 4453
had sign
14.3%, *P*
(5600 m
REBOA p

Conclusions

Zone 3 REBOA in hypotensive blunt pelvic trauma was associated with higher mortality and transfusion needs. These findings highlight the need for cautious use and further prospective investigation.

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REBOA bu hastalarda yüksek mortalite ve transfüzyon oranları ile beraber

Surgery Open Science 19 (2024) 146–157

Contents lists available at ScienceDirect

Surgery Open Science

journal homepage: www.journals.elsevier.com/surgery-open-science

Research Paper

Pelvic packing or endovascular interventions: Which should be given priority in managing hemodynamically unstable pelvic fractures? A systematic review and a meta-analysis

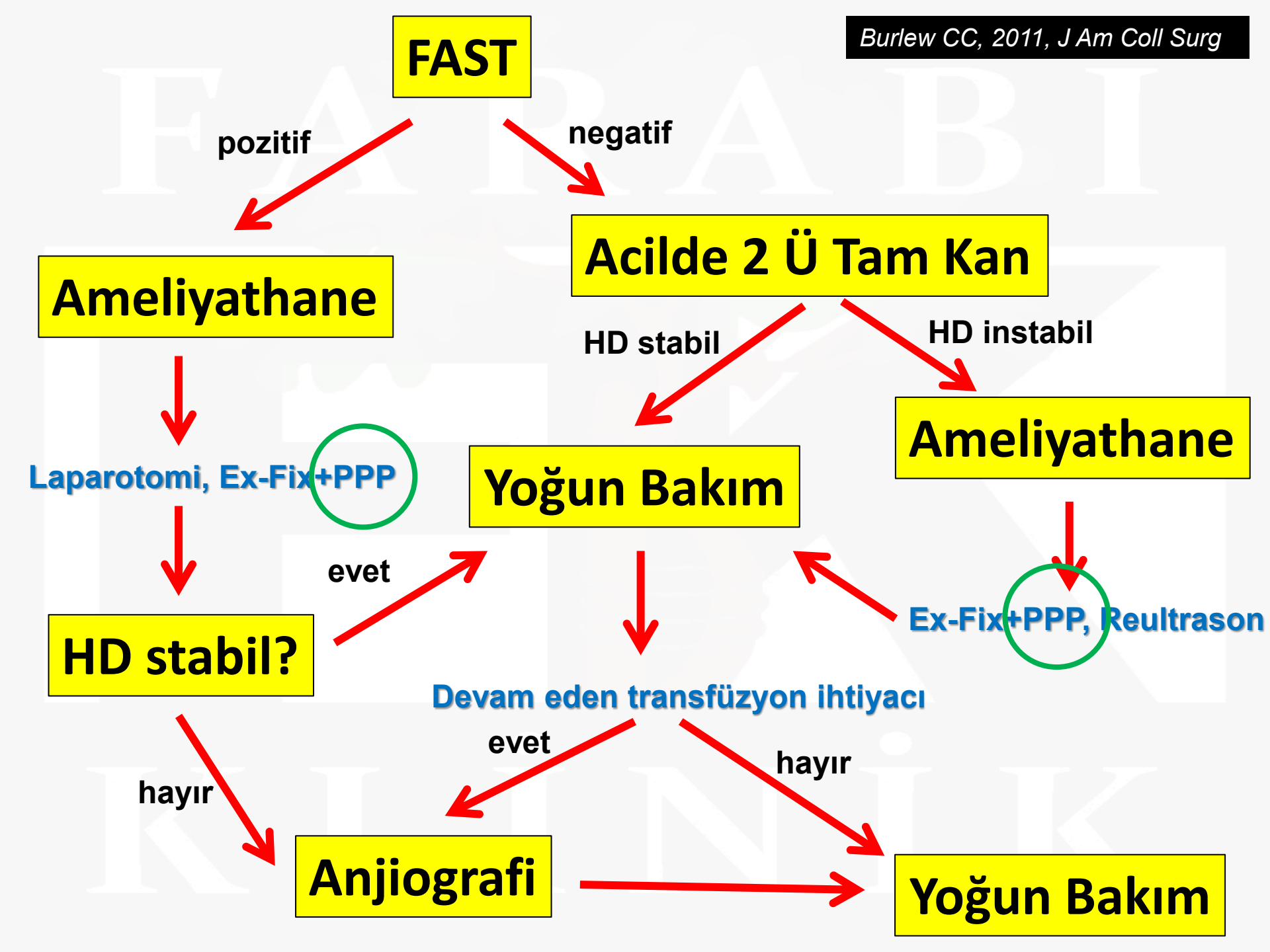
Conclusion

In summary, PP presente
and operating time, a po
due to complications. For
high priority, especially when bleeding occurs from the veins, internal pelvic vessels, and fractures. EI should be regarded as a
complementary treatmer
injury, recurrent hypoten
with hemorrhagic shock
larger sample size, and d

PPP hızlı etkin ve hayat kurtarıcı görünüyor, öncelikle düşünülmeli

PP rağmen toparlanamayan hastalarda Anjiografi veya REBOA düşünülebilir

matching studies, prospective cohort studies, observational cohort studies, quasi-randomized clinical trials evaluating PP and EI (AE or REBOA) for the management of patients with hemodynamically unstable pelvic fractures, were included. Mean Difference (MD), relative risk (RR), and 95 % confidence intervals (CI) were


Burlew CC, 2011, J Am Coll Surg
FAST
pozitif
negatif
Ameliyathane
Acilde 2 Ü Tam Kan
HD stabil
HD instabil
Laparotomi, Ex-Fix+PPP
Yoğun Bakım
Ameliyathane
evet
HD stabil?
Ex-Fix+PPP, Reultrason
Devam eden transfüzyon ihtiyacı
evet
hayır
hayır
Anjiografi
Yoğun Bakım

Öğrendiklerimiz:

- Kanamanın büyük bölümü venözdür
- Pelvisin erken redüksiyon ve tespiti venöz kanamanın en önemli kontrol yöntemidir
- Kırık uçlarının karşılaştırılması kanamayı azaltır
- Kırık uçlarında hareketin azalması pıhtı oluşumunu kolaylaştırır
- Kompresyon kanamayı azaltır

Eve gidecek mesaj

- Pelvis kırığı öldürür!..
- Noninvazif tespit yöntemleri ve çarşaf uygulamasını unutma
- Açık kırıklar: Kolostomi ve eks-fiks
- Hemodinamik instabilite: anjiografi ve pelvik paketleme hayat kurtarır
- Takım çalışması, ulusal algoritma ve politikalar gereklidir