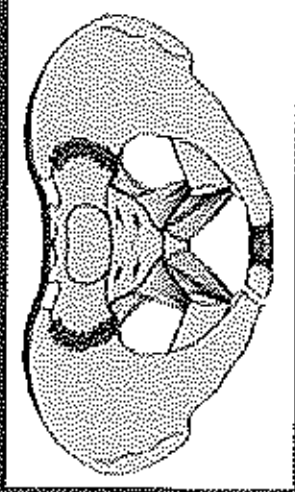
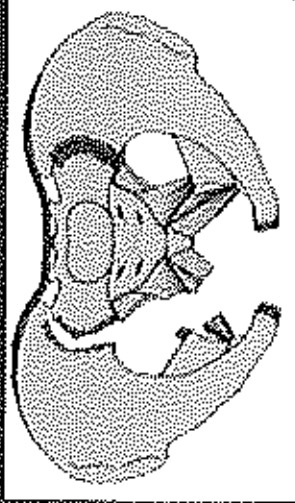


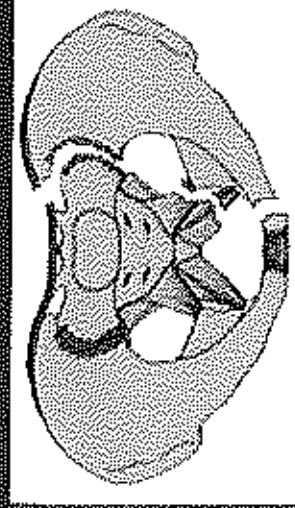
Tile Classification



Tile Type A
Stable



Tile Type B
Rotationally Unstable
Vertically Stable



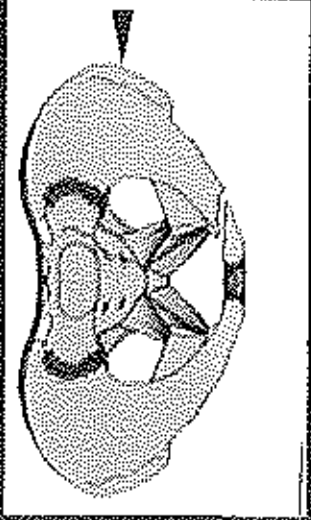
Tile Type C
Rotationally Unstable
Vertically Unstable

Young & Burgess Classification

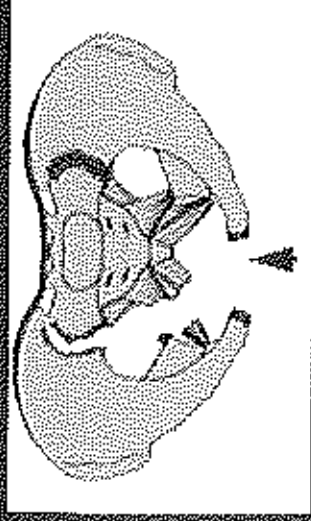
Mechanism of Injury & Direction of Force

- * Three patterns
 - * Lateral MVC (30%)
 - * Pedestrian struck on side by car
 - * MVC in which car is broadsided
 - * AP compression/open book (35%)
 - * Head-on MVC
 - * Pedestrian struck anteriorly by car
 - * Vertical Shear (5%)
 - * Fall or jump from height
 - * Combination (20%)

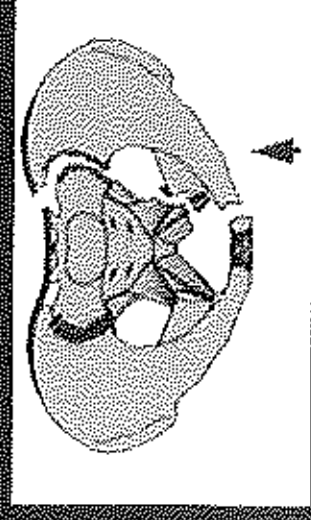
Young & Burgess Classification



Lateral Compression



AP Compression



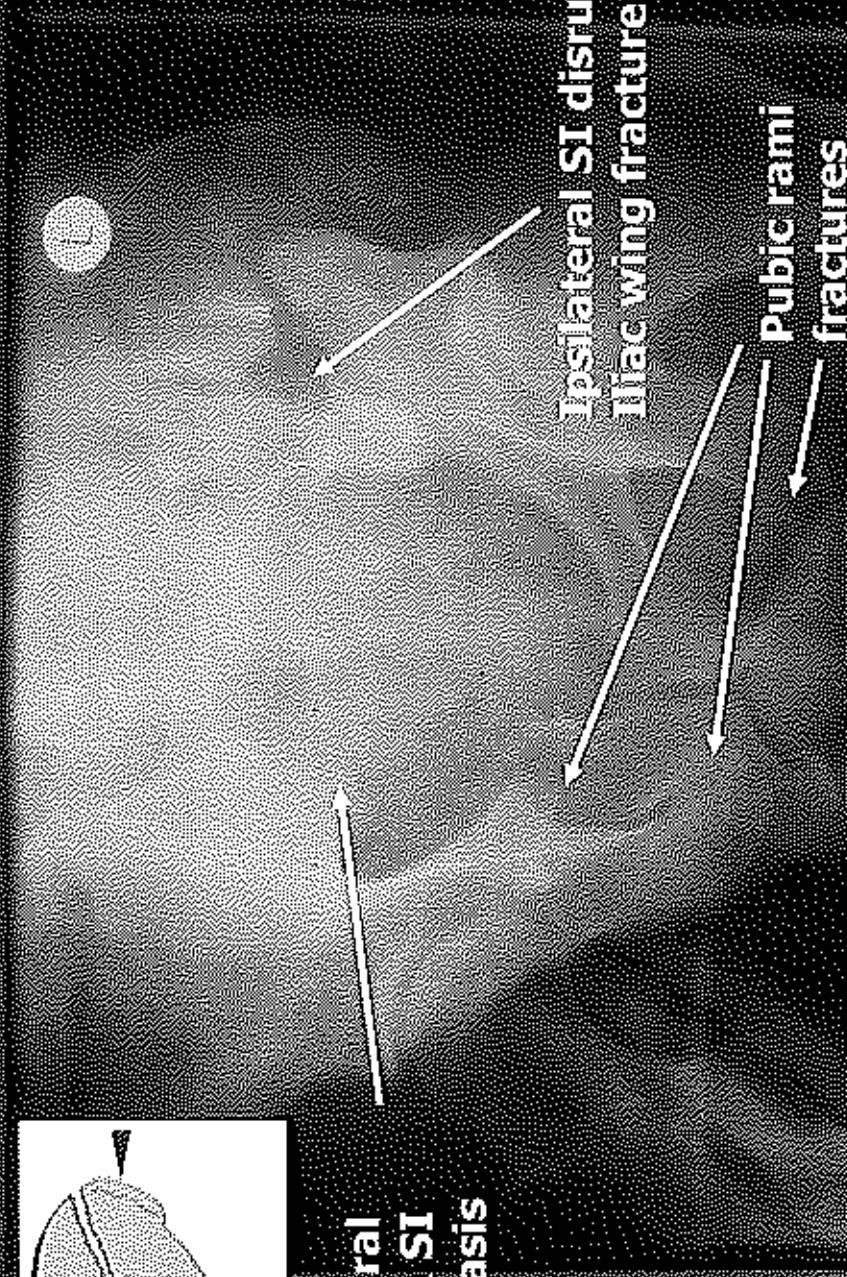
Vertical Shear

Lateral Compression: LC-III

Windswept Pelvis



**Contralateral
sacral fx & SI
joint diastasis**



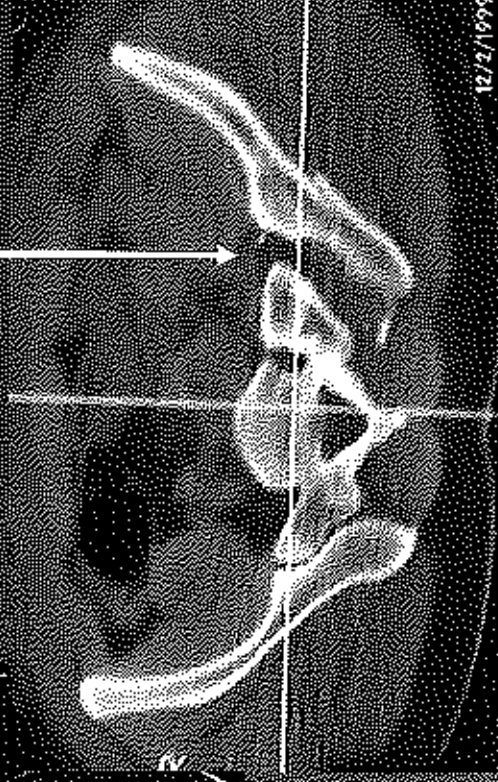
**Ipsilateral SI disruption
Iliac wing fracture**

**Pubic rami
fractures**

AP Compression: APC-III



Wide SI Joint

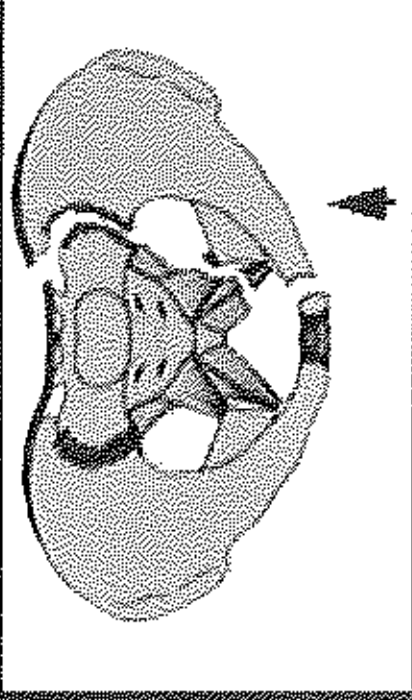


Wide Pubic Symphysis

12/2/1995

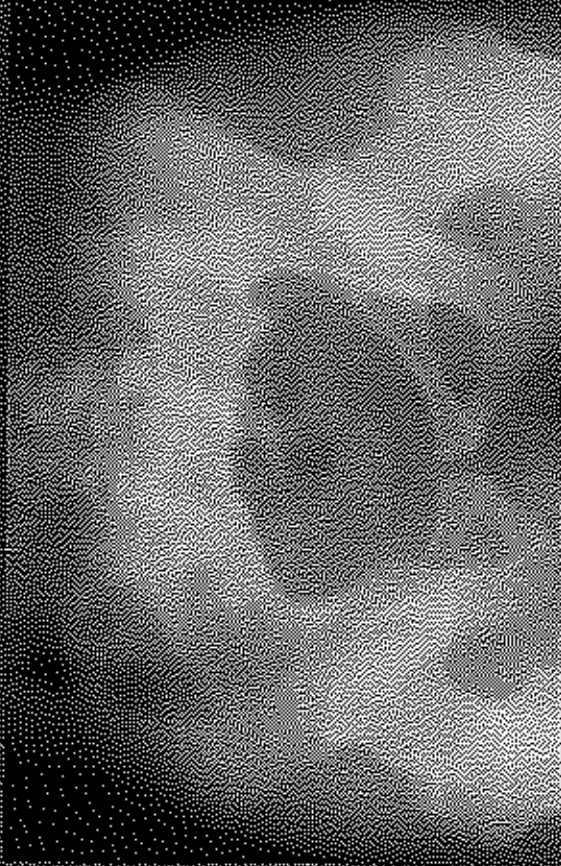
Vertical Shear

- * Least common
- * Vertical force
 - * Fall from height, landing on LE
 - * Pelvis disrupted in vertical plane
 - * Cephaloposterior displacement
 - * Malgaigne fracture
- * Grossly unstable!
- * High incidence of neurovascular injury



Vertical Shear

- * Left hemipelvis displaced cephalo-posteriorly
- * Associated sacroiliac joint diastasis
- * Pubic rami fracture
- * Ipsilateral (usually)
- * Vertically oriented



Vertical Shear



Complete disruption of posterior elements

Factors Increasing Mortality

- * Type of pelvic ring injury
 - * Posterior disruption
- * High ISS
 - * Tile, 1980
 - * McMurty, 1980
- * Hemorrhagic shock on admission
 - * Gilliland, 1982

Factors Increasing Mortality

- * Requirement for large quantities of blood
 - * 24 u vs. 7 u, McMurty, 1980
- * Perineal lacerations, open fractures
 - * Hanson, 1991
- * Associated injuries
 - * Head & abdominal, 50% mortality
- * Age
 - * Looser, 1976

Extremely High Energy Injuries
with a Large Number and Variety
of Associated Injuries

Instability

shock

Etiology of Hypovolemic Shock

- * Intra-thoracic bleeding
- * Intra-peritoneal bleeding
 - * Ultrasound
 - * Peritoneal tap
 - * CT
- * Retroperitoneal bleeding

Burgess, J Trauma 1990

- * Mortality 8.6%
- * 2/210 pelvic injury patients where pelvic injury was primary cause of death
- * Contributed 10/210

Adams, JOT 2003

- * Up to 25% pelvic fractures in traffic fatalities
- * Most commonly vertically unstable fractures
- * Perhaps more common than originally thought

Hemorrhage Control

- * Average blood replacement (units)

- * LC = 3.6

- * AP = 14.8

- * VS = 9.2

- * Mortality

- * 3% hemodynamically stable patients

- * 38% unstable patients

Hemorrhage (cont.)

- * Sheet/C-clamp
- * Skeletal traction
- * External fixation
- * Mast suit
- * Embolization
- * Surgical stabilization +/- packing

Hemorrhage (cont.)

- * Contributes to 60% of deaths
- * Retroperitoneal veins
- * 20% arterial injury

Coagulopathy

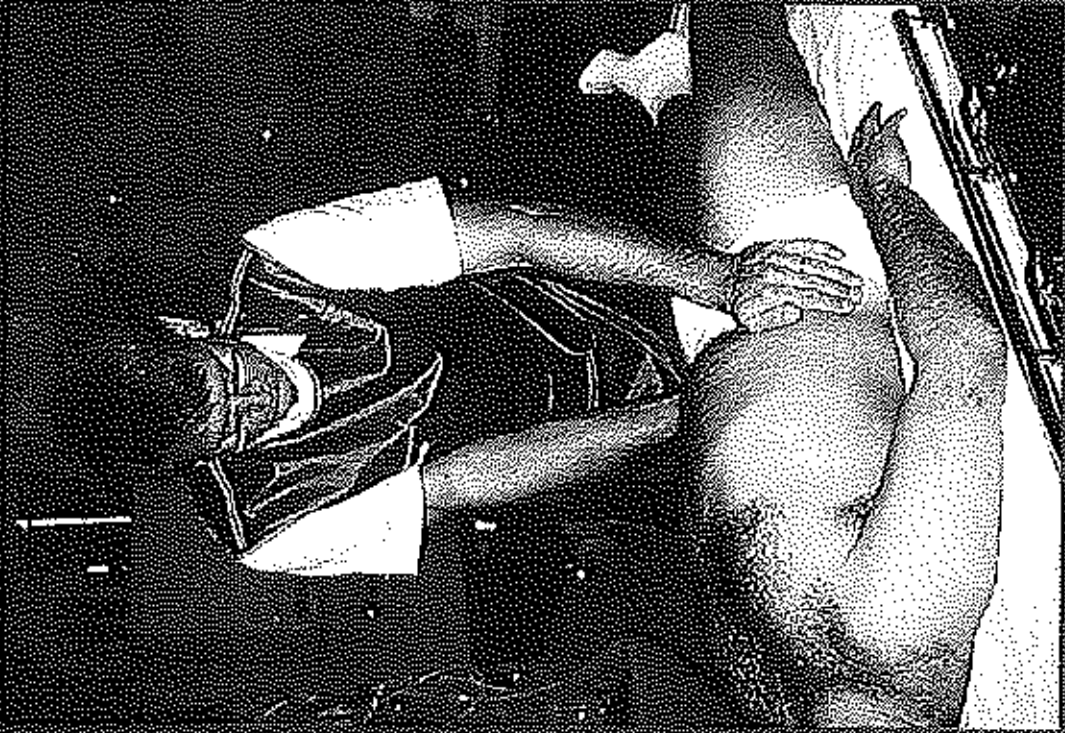
- * Hypothermia
- * ↓ Ca²⁺ (blood citrate)
- * Acidotic

Prolonged Hypovolemia

- * Aggravate pulmonary contusion
- * Head and visceral injuries
- * Increased sepsis
- * Adult respiratory distress syndrome (ARDS)
- * Multiple organ failure

Instability

Only patients with mechanical instability can have hemodynamic instability related to the pelvic injury



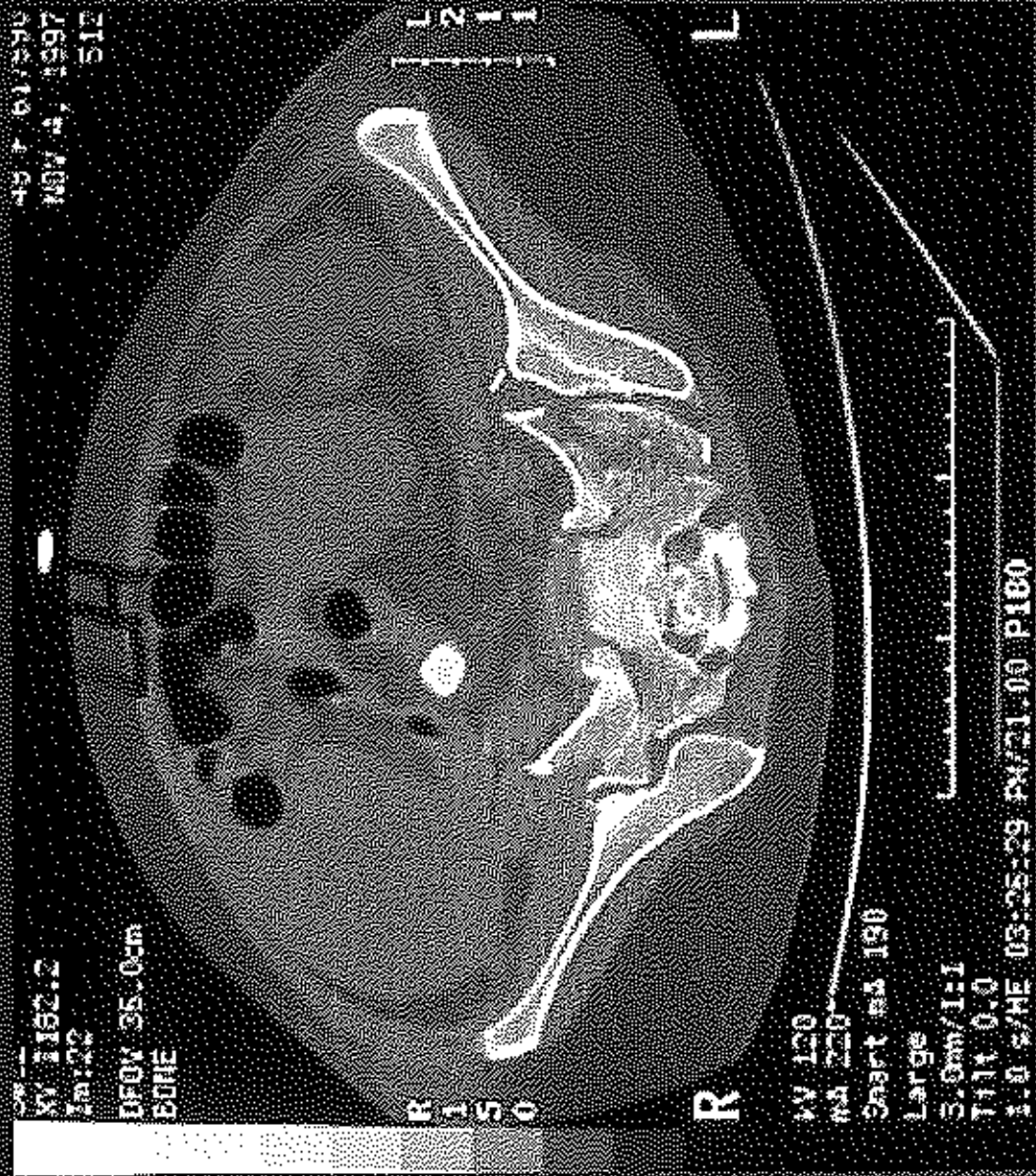
457 01396
NOV 4, 1997
512

W 1162.2
1m:22
DFOV 35.0cm
BONE

R 150

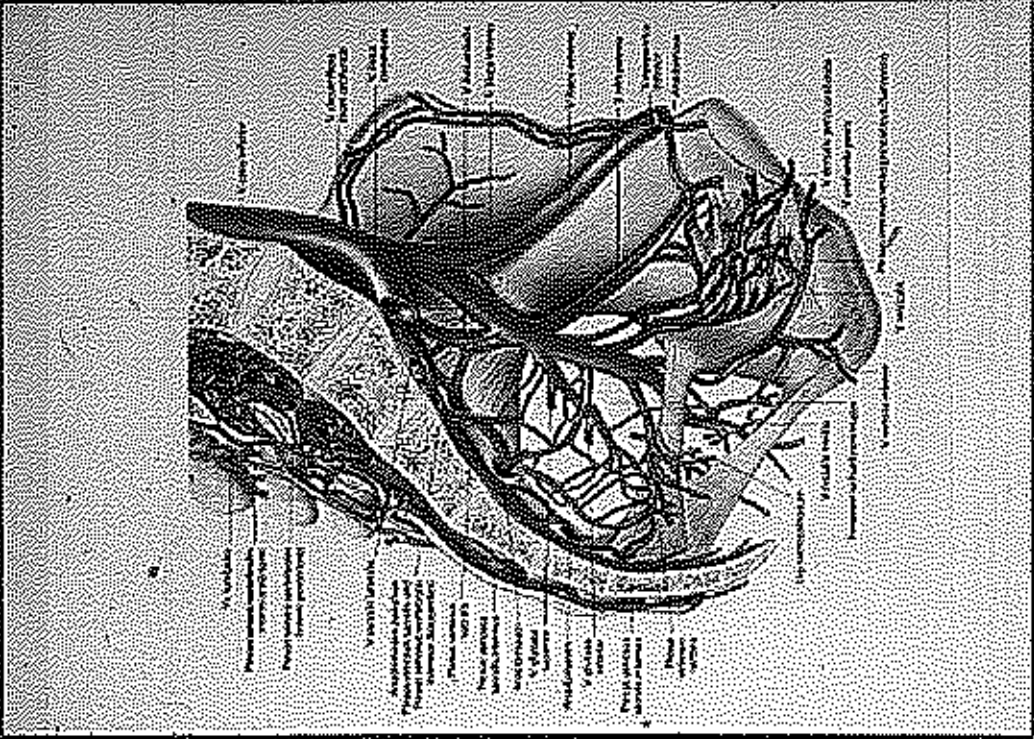
R

KV 120
mA 220
Shart mA 190
Large
3.0mm/1:1
Tilt 0.0
1.0 s/HE 05:05:29 PW/21.00 P160



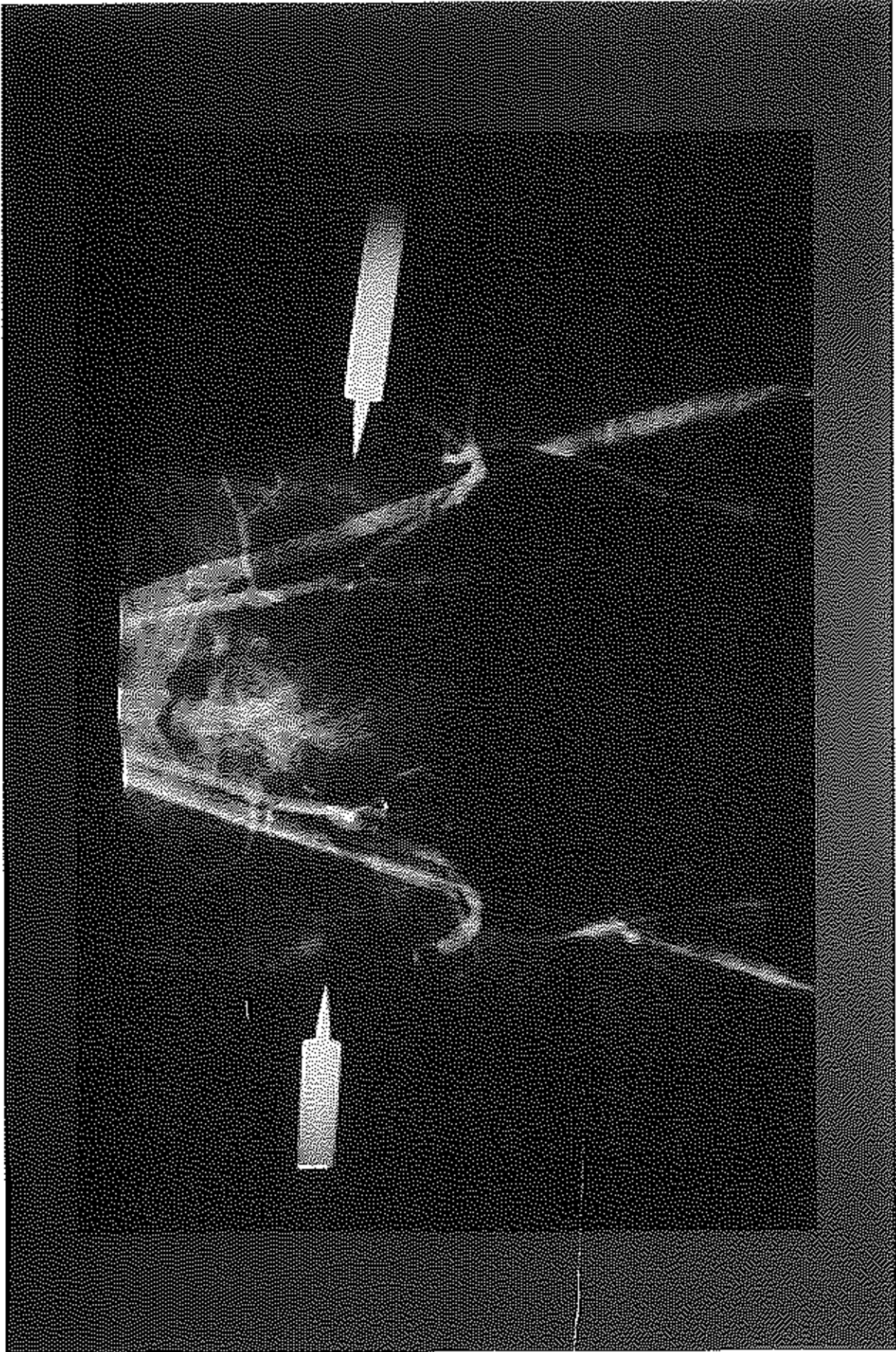
Radiographic Signs of Instability

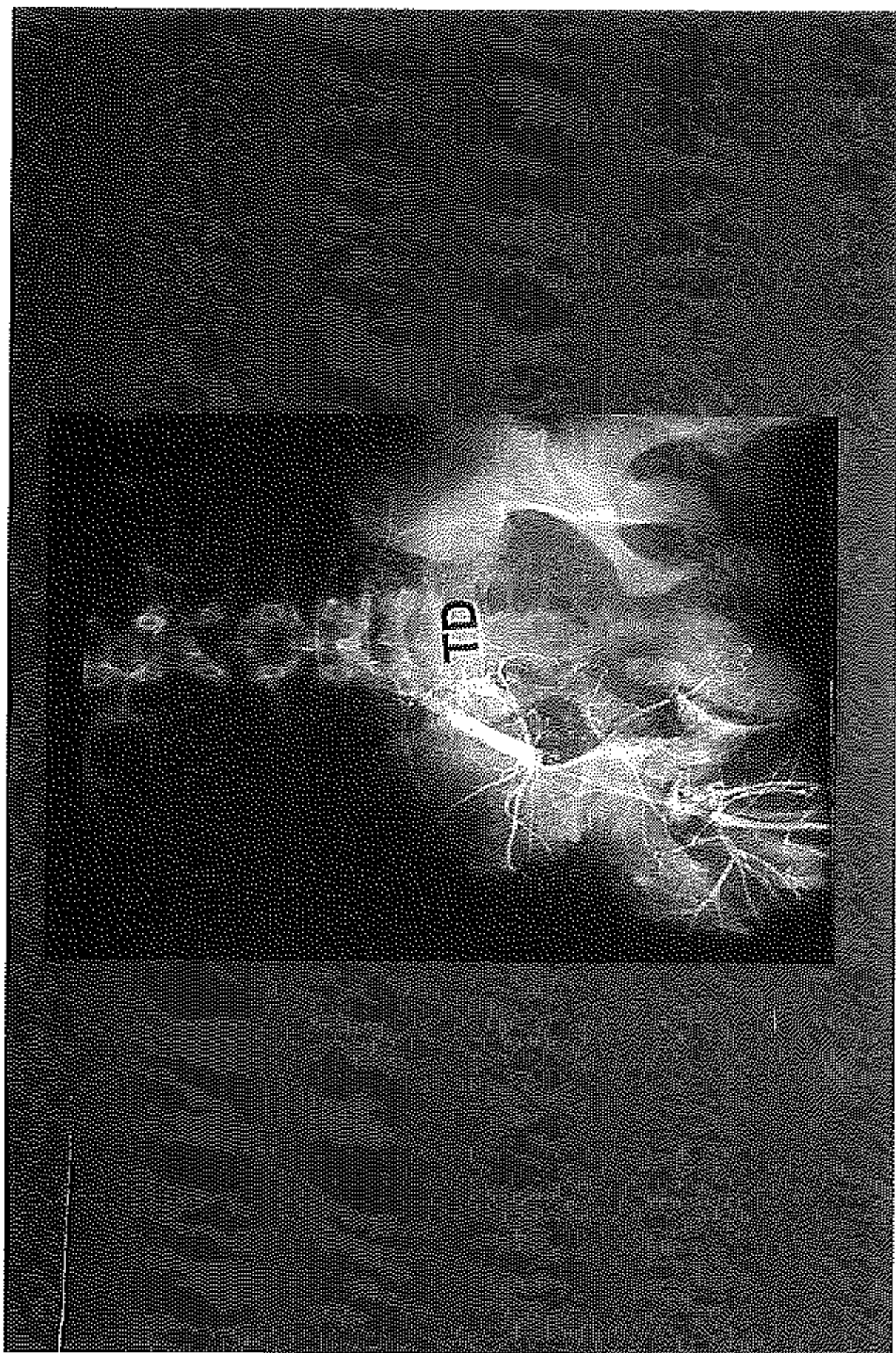
- * Sacroiliac displacement of 5 mm in any plane
- * Posterior fracture gap (rather than impaction)
- * Avulsion of fifth lumbar transverse process, lateral border of sacrum (sacrospinous ligament), or ischial spine (sacrospinous ligament)



Indications for Angiography

- * Unexplained blood loss after stabilization and aggressive resuscitation
- * Pulselessness extremity





Surgical

- * Stabilization with internal fixation of pelvis
- * Stabilization of hemodynamic instability with surgical packing of retroperitoneal space

Associated Injuries

* Other MSK

- * Long bone injuries
- * Knee injuries
- * Foot injuries

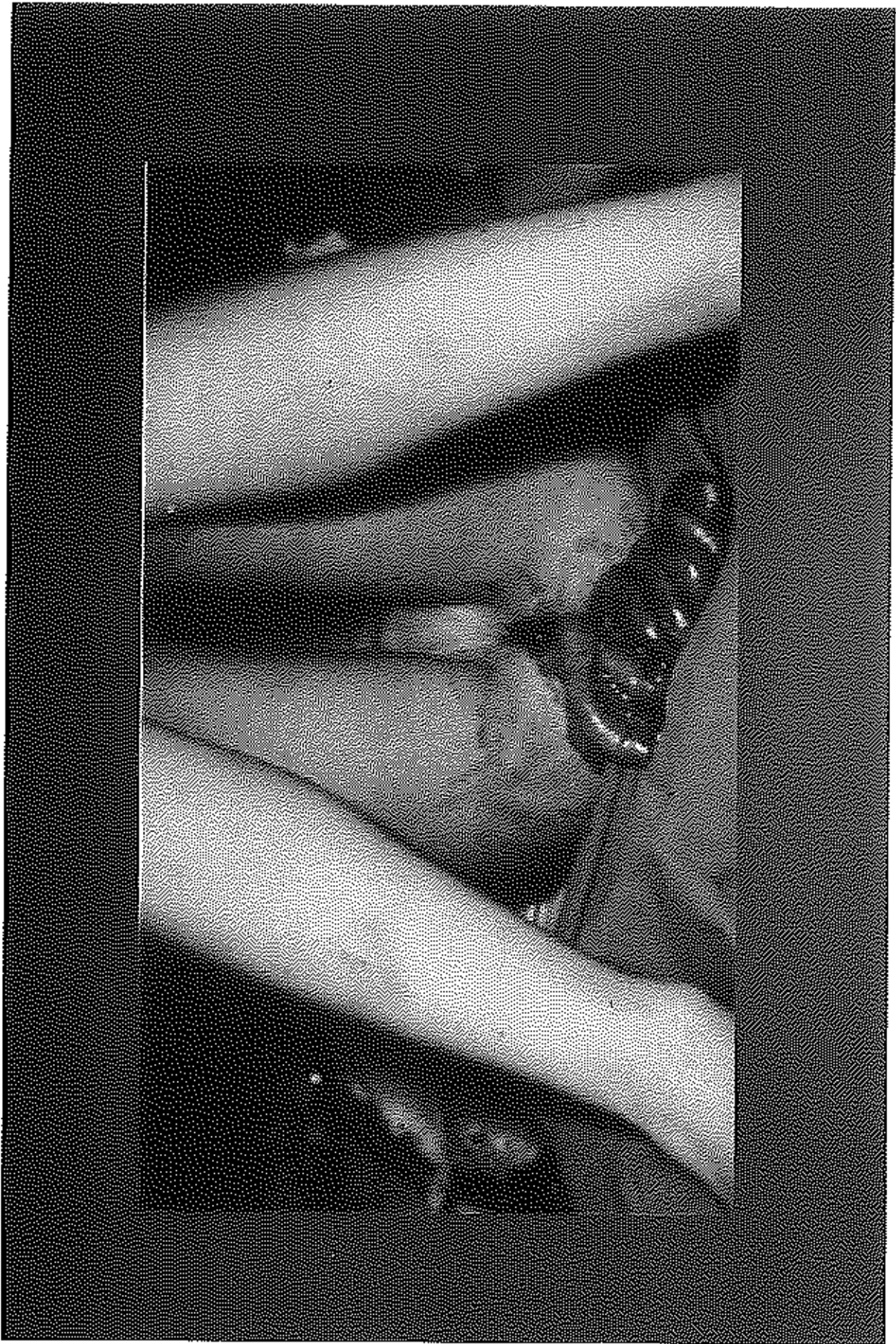
* Abdominal

* Urologic/Gyne

* Neurological

Open Pelvic Injuries

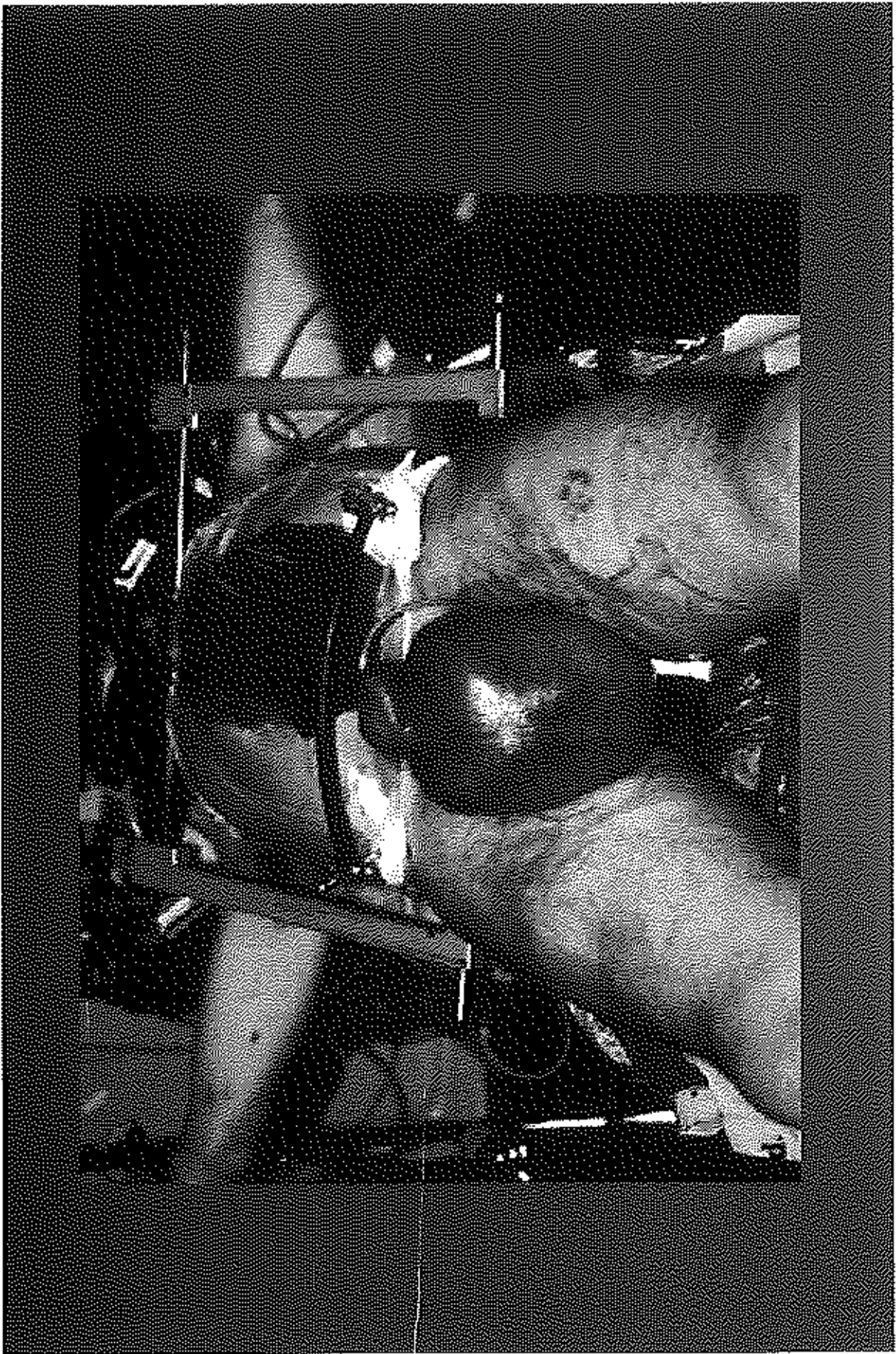
- * Colon, rectum, or perineum → Early diverting colostomy
- * Soft-tissue wounds → aggressively debrided
- * Early repair of vaginal lacerations minimize subsequent pelvic abscess



Colostomy is Indicated for Any
Open Injury Where the Fecal
Stream Will Contact the Open
Area

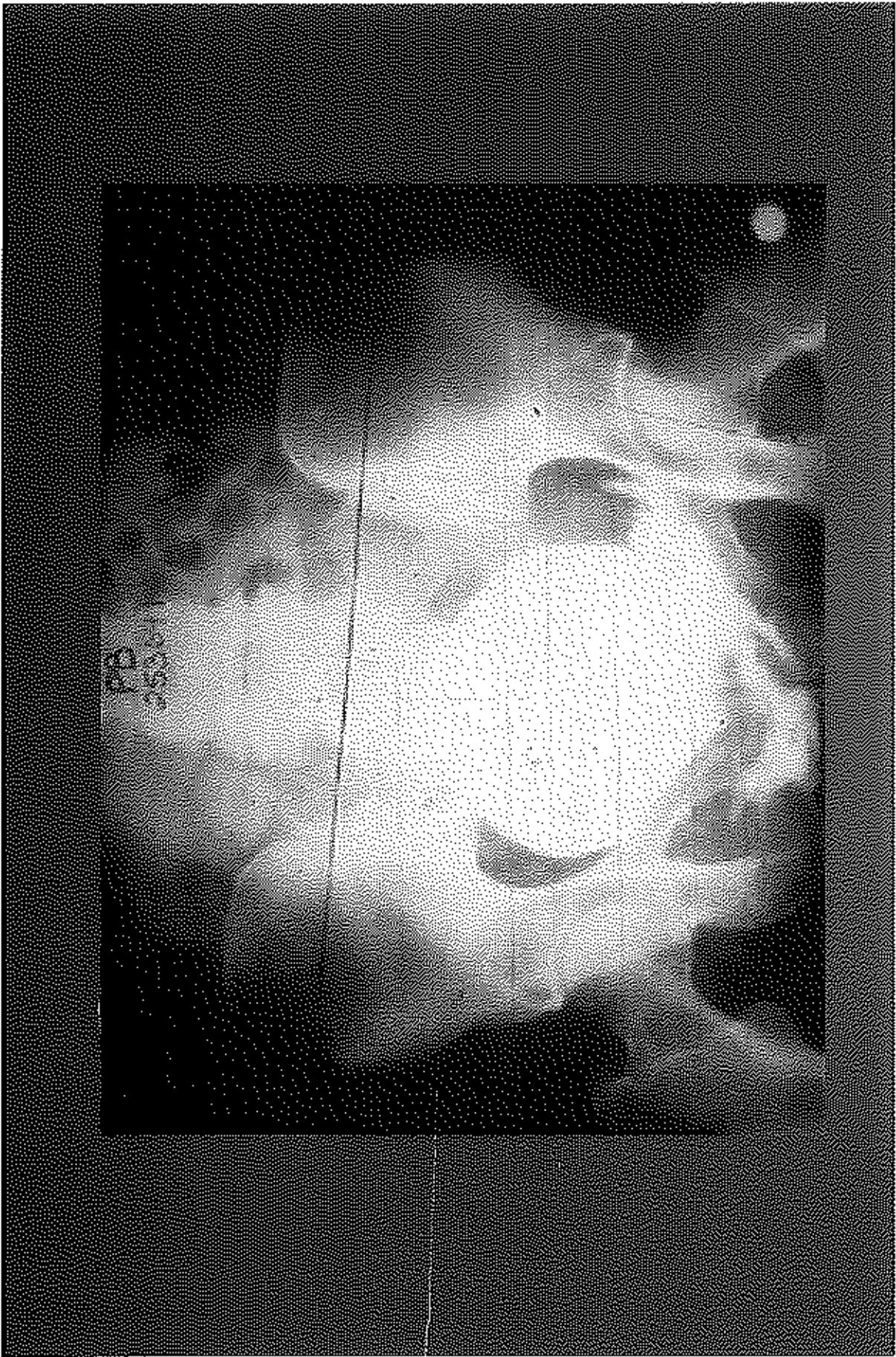
Urologic Injuries

- * 15% incidence
- * Blood at meatus or high riding prostate
- * Eventual swelling of scrotum and labia (occasional arterial bleeder requiring surgery)



Urologic (cont.)

Retrograde urethrogram indicated in pelvic injured patients but insure hemodynamic stability or embolization may be difficult due to dye extravasation



Urologic (cont.)

- * Intra & extra peritoneal bladder ruptures are repaired
- * Foley preferred supra-pubic catheter tunneled to prevent ant. wound contamination

That's A lot of Info!

Any Questions??