

Mimickers of Abusive Head Injury

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Skull Fractures

- Skull fractures are contact injuries
- Not all fractures are accompanied by intracranial injury
- The intracranial injury or lack thereof determines the clinical course of the head injury

Healing skull fracture

- 5 wk old male died 8/12/01
- On 8/9/01 at 4 pm grandmother took baby to her home – did well, ate and slept
- Mother and father picked up infant at 8:30 pm and took him home
- Usual activities and eating
- To bed at 12:30 am 8/10/01

Healing fracture 2

- Usually sleeps in bassinet at foot of bed
- Mom hears infant at 3:30 am, gets up to check on him
- It's dad's turn to feed him – dad lies on couch to feed him – she goes back to bed
- At 4:30 am she hears dad yelling infant is not breathing

Healing fracture 3

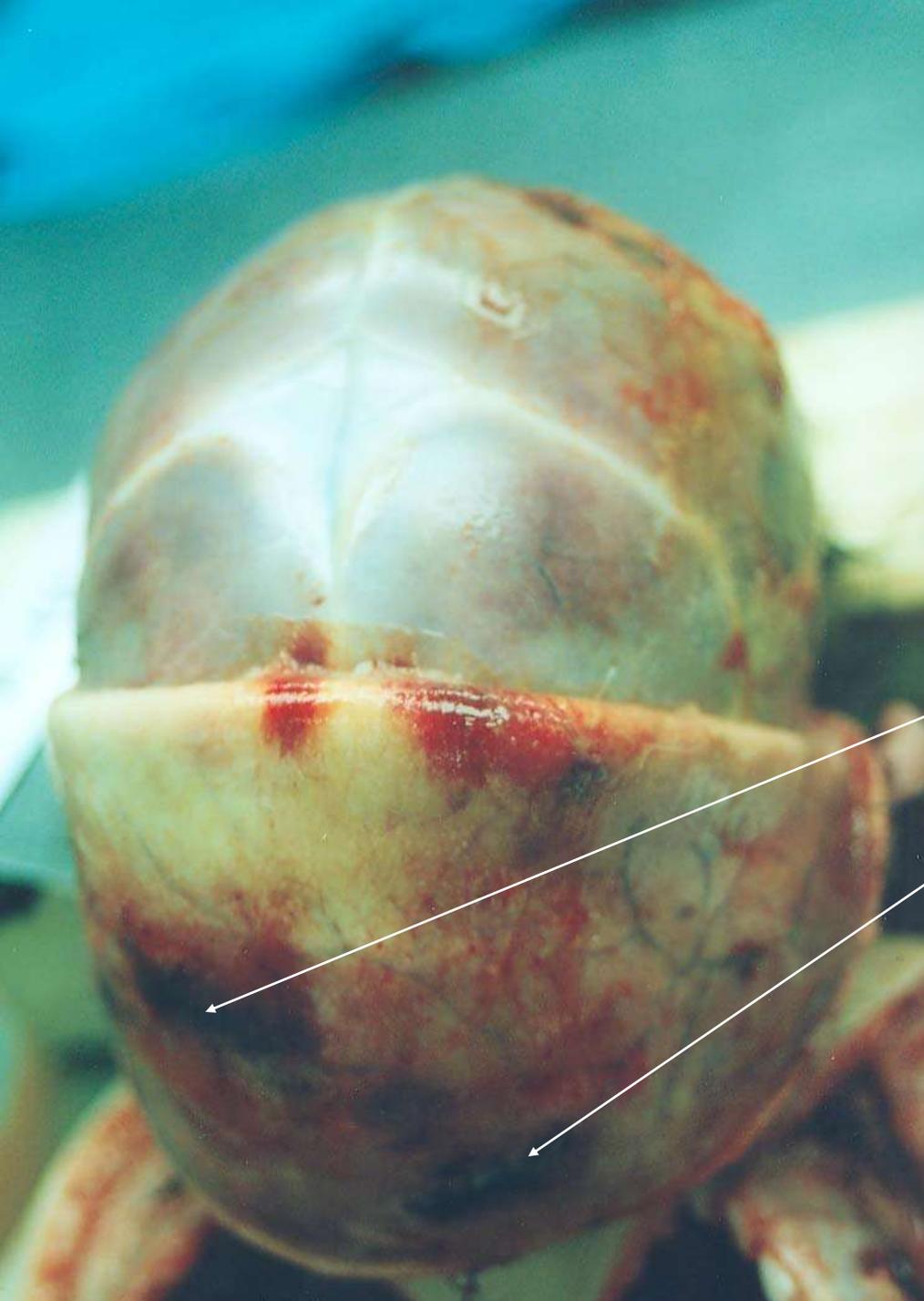
- Infant lying on couch – not breathing, pale
- They take him to hospital nearby
- Admitted unresponsive, pupils fixed and dilated
- Past history unremarkable
- CT shows skull fracture

Healing fracture 4

- Dies next day
- Autopsy –
 - Contusions of frontal scalp, 2
 - Periosteal hemorrhage, left parietal
 - Left parietal skull fracture
 - No intracranial hemorrhage
 - No other injuries

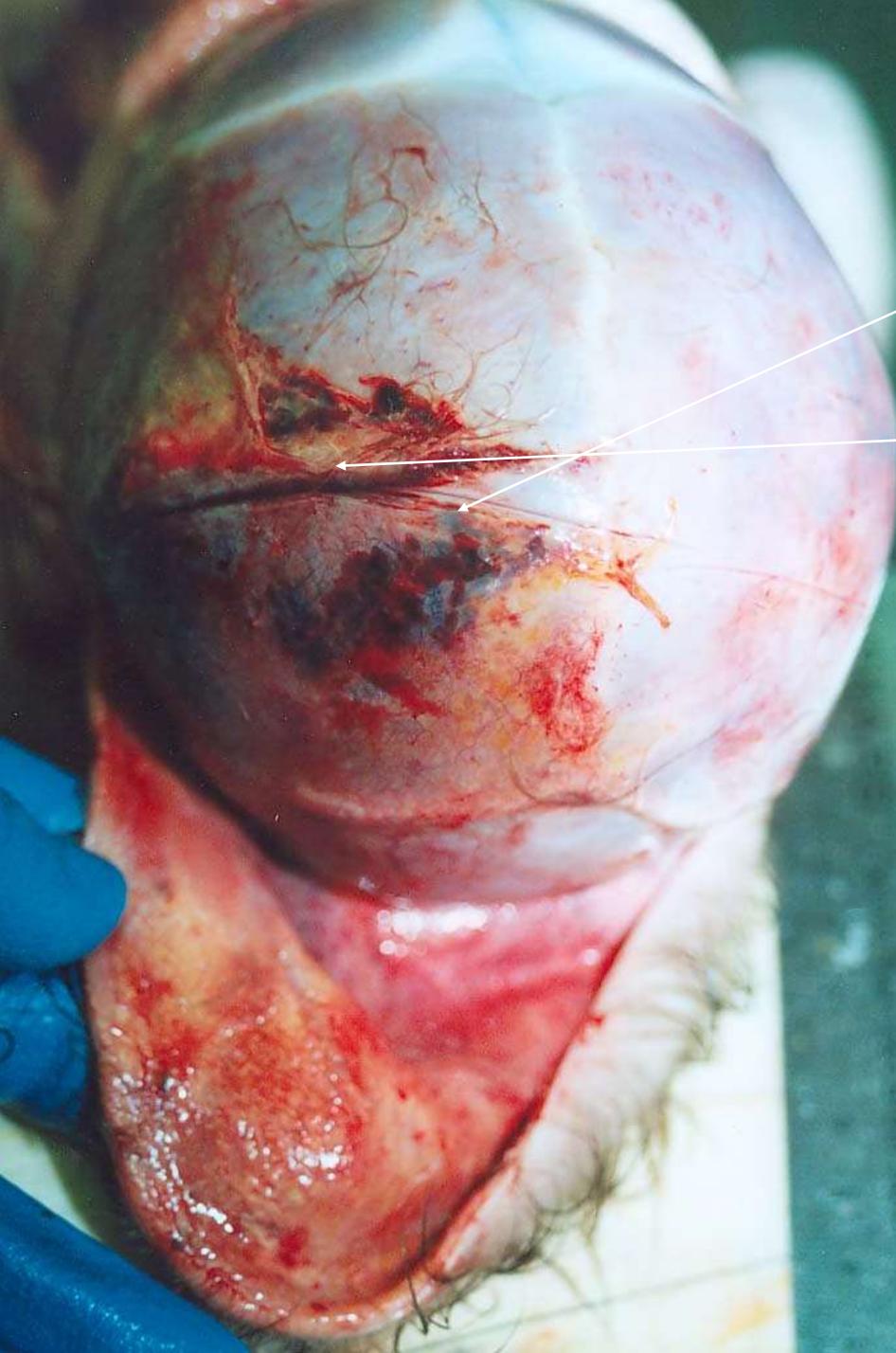
Healing fracture 5

- COD – blunt force injury of head
- MOD – homicide
- Case referred for forensic neuropathology
- Calvarium, brain, and eyes examined
- Left parietal fracture – healing – 5.7 cm fx with a component 4 cm
- Margins show fibrous union



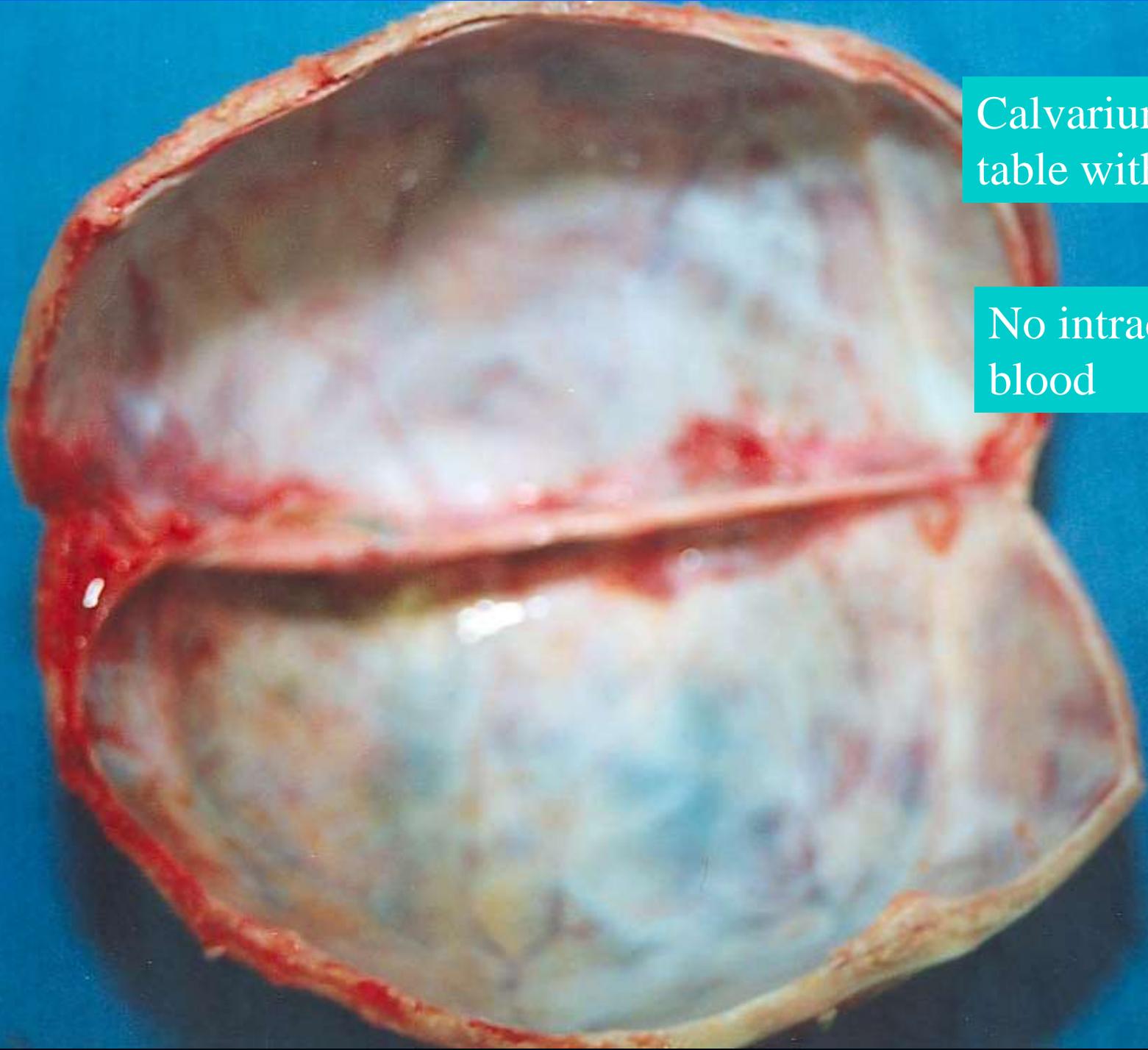
Scalp reflected

Subgaleal hemorrhages



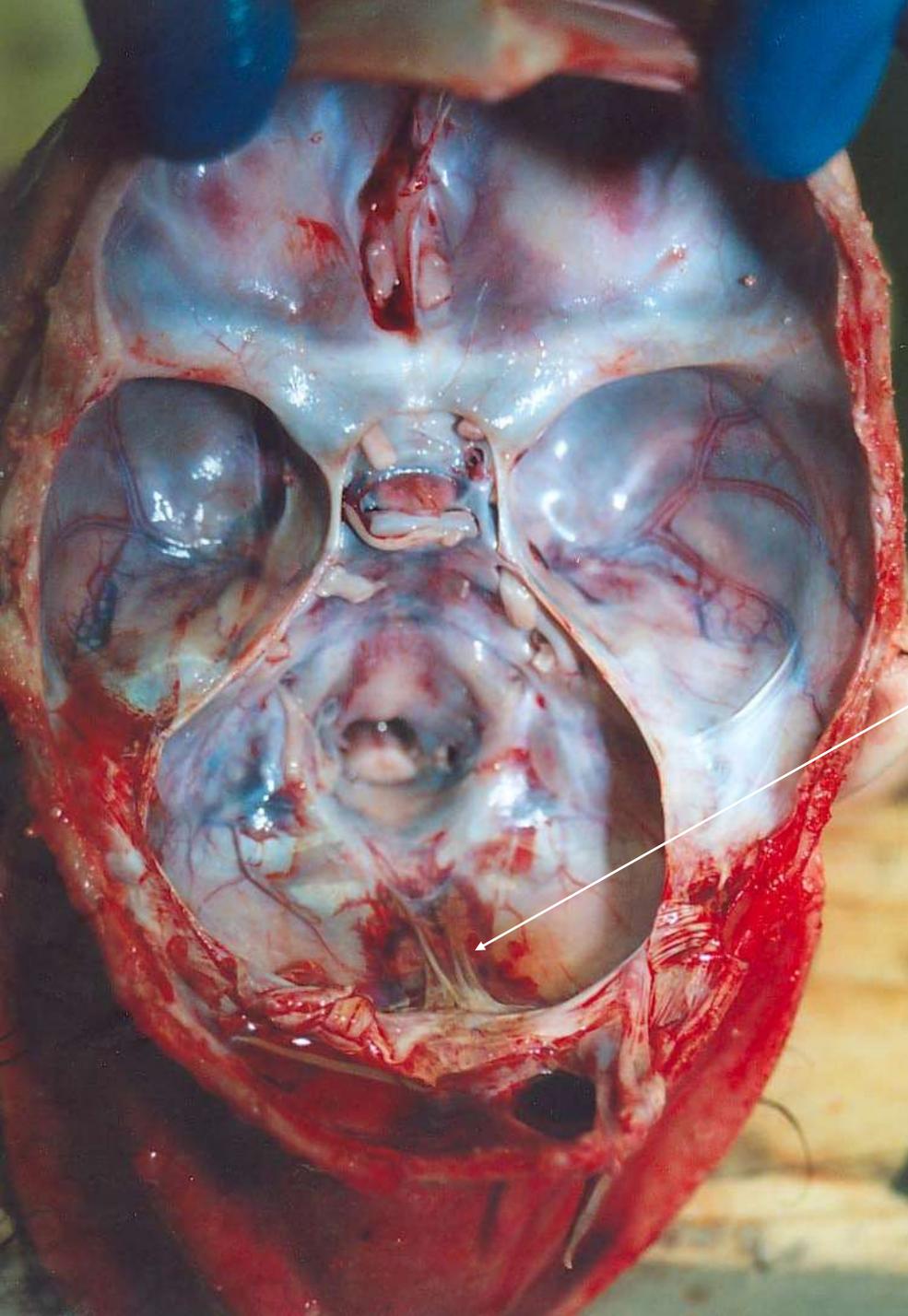
Left parietal subgaleal hemorrhage

Left parietal fracture - healing



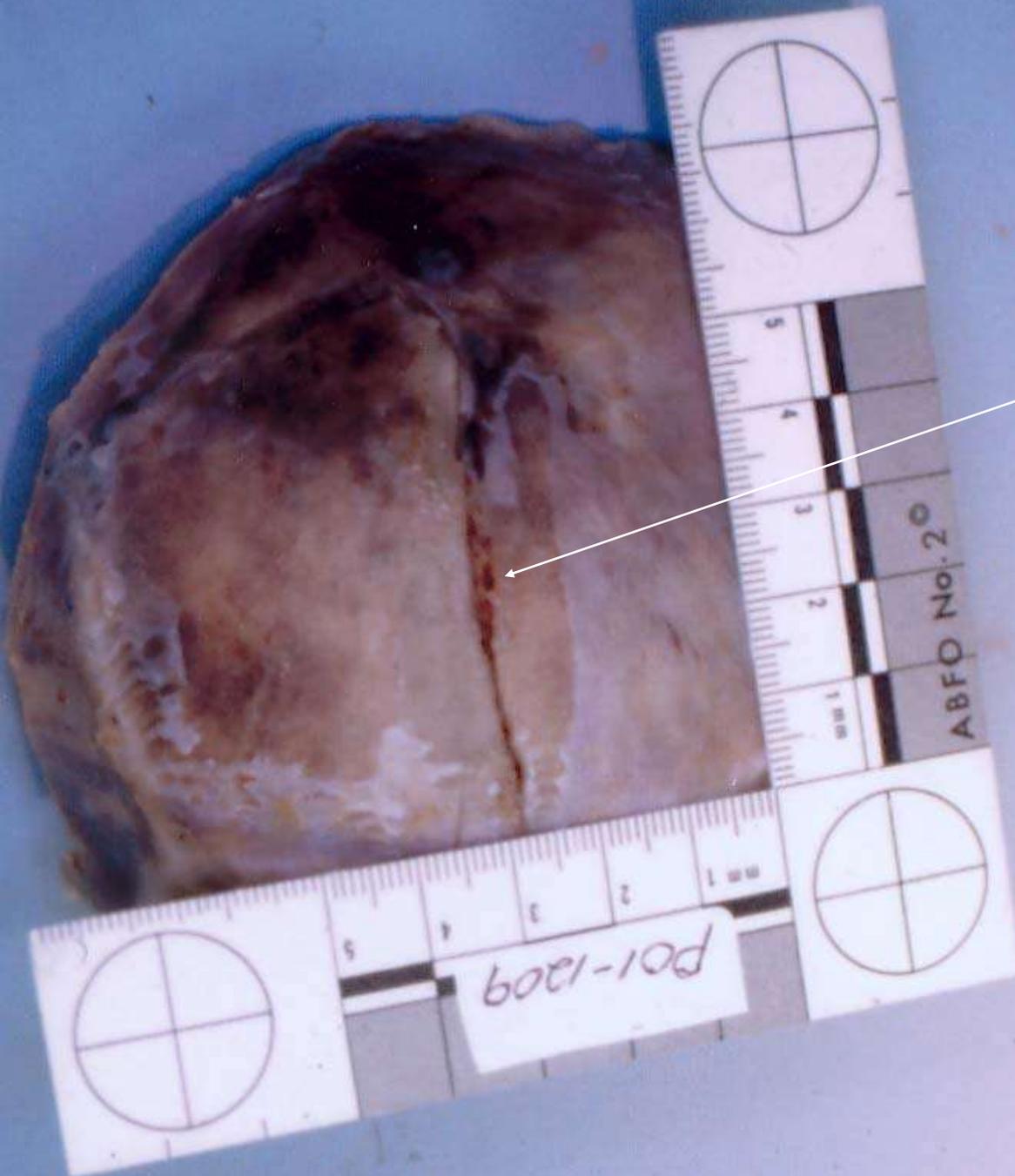
Calvarium inner
table with dura

No intracranial
blood



Base of skull

Focal area of hemosiderin staining



Left parietal skull fracture healing with periosteal fibrosis

Eyes gross



Eyes cut

Negative for hemorrhage



Healing skull fracture 6

- Fibrous union – gray-tan fibrous tissue uniting the bone fragments
- On inner table – thin layer of organizing epidural blood along fx margins
- Micros – healing fx – 6 – 8 days minimum
- Galea – older hemorrhage with hemosiderin
- Eyes – negative for hemorrhage

Healing skull fracture 7

- Opinion – this child did not die of head injury – all the injuries are older
- Child had not been symptomatic from the head injury – many people saw child on 8/9/01
- This injury would not cause LOC
- Skull fx is abusive – no accidental history to account for it

Healing skull fracture 8

- Dad subsequently gives 2 stories of abuse to child
- One story – he struck child hard with hand while child lying on bed
- Second story – he threw a bottle of formula at child and struck the head
- Neither incident caused anything but crying
- Either of these could cause the fx

Healing skull fracture 9

- Cause of death may be related to co-sleeping with dad on couch – no death scene investigation was carried out
- COD – undetermined
- MOD undetermined

Healing Skull fractures

- 9 mo old male – 4 yr old sibling taking bath
– child with mom also in bathroom – mom leaves to answer phone – comes back to find 4 yr out of tub and 9 mo old in tub – 8 ½ in water – on back under water
- Autopsy
 - Subgaleal hemorrhages, R parietal, L post parietal, L occipital(2)

Healing Skull Fractures 2

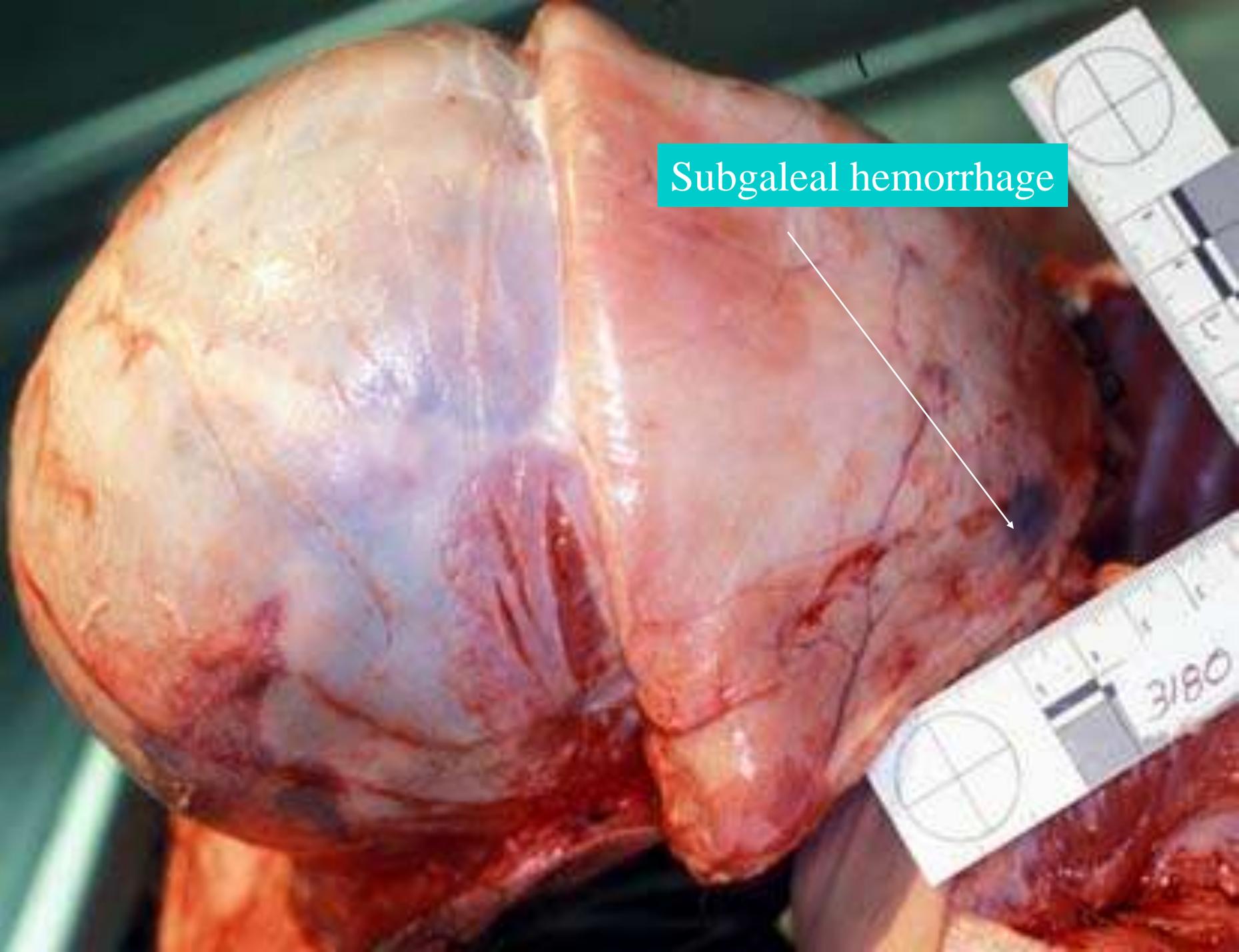
- Healing skull fractures, linear fx R parietal and complex fx R parietal – age more than one week less than 3 weeks
- Eyes – negative for hemorrhage
- COD – Drowning
- MOD - Undetermined



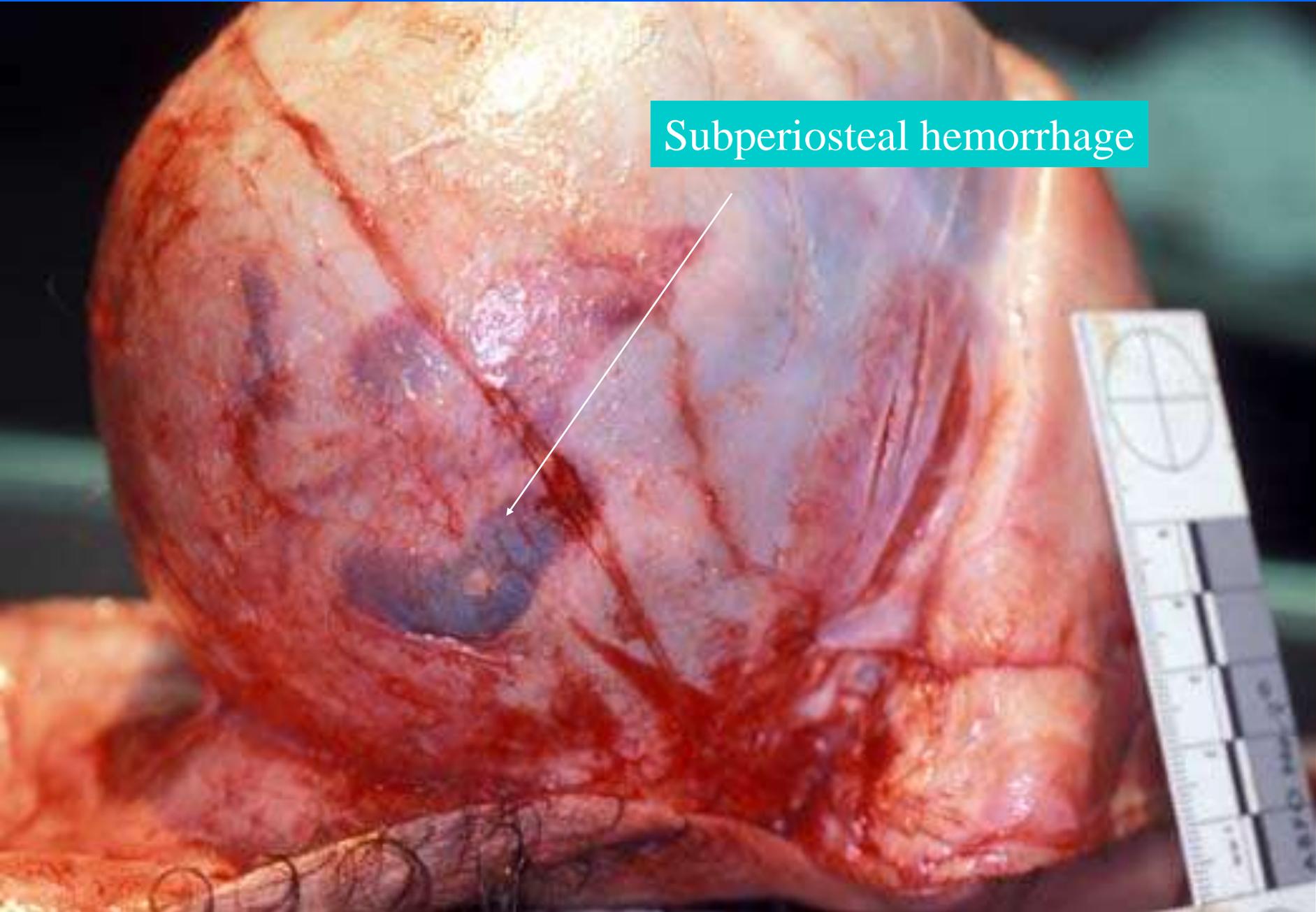
R parietal fracture



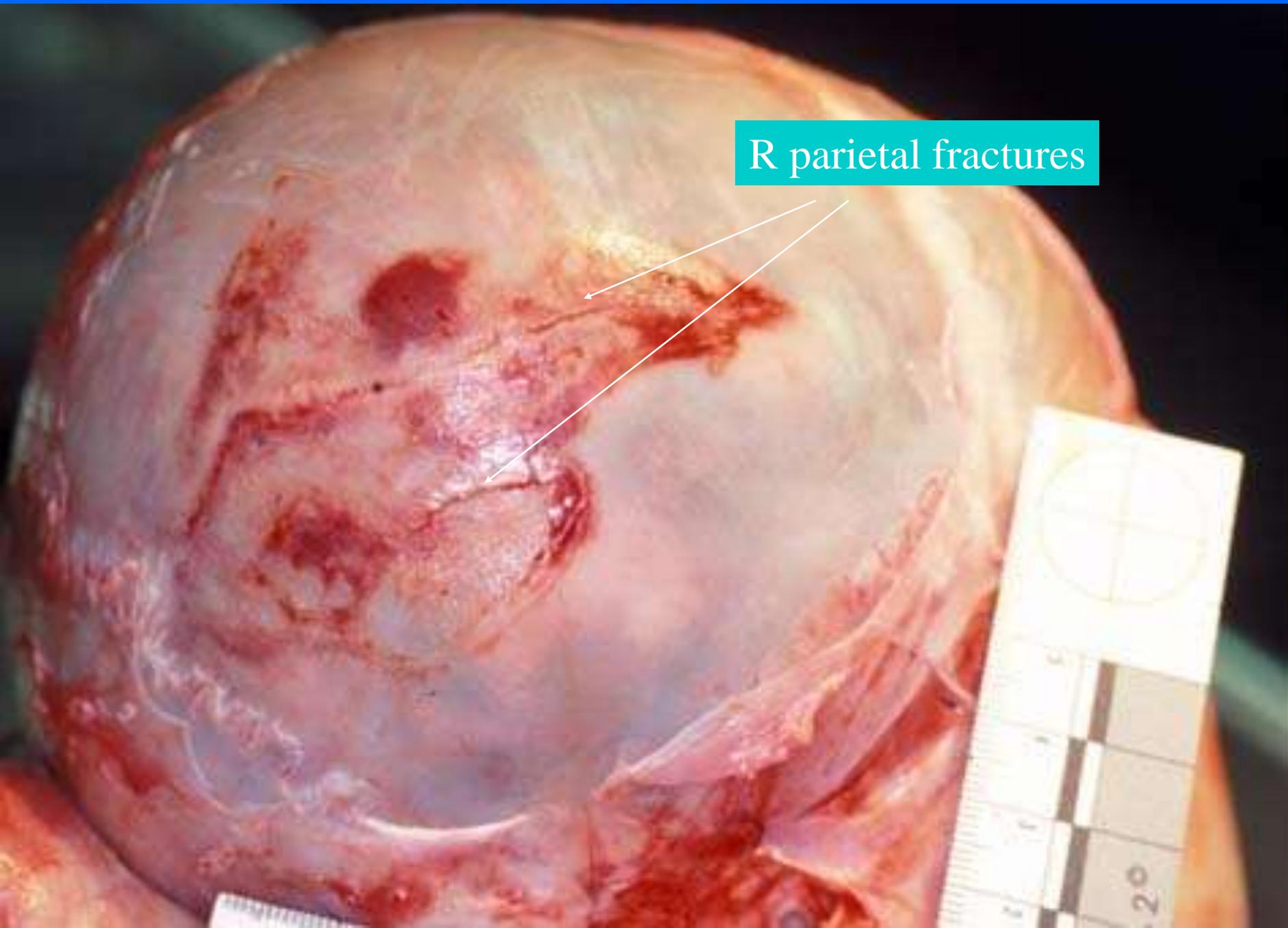
Subgaleal hemorrhage



Subperiosteal hemorrhage



R parietal fractures





Calvarium opened –no
intracranial hemorrhage

Diastasis of Sutures

- Splitting or diastasis of sutures may be misdiagnosed as skull fractures
- Can happen within 24 hours
- Should not be considered as a primary injury
- Seen with all types of brain swelling before closure of sutures

Split Sutures

- 3 mo old male died 11/5/93
- On 11/3/93, 911 was called for a child not breathing
- Found infant unresponsive – to hospital
- Arrived in full arrest despite prolonged resuscitation
- Pulse was regained

Split Sutures 2

- No neurologic function, flaccid, pupils fixed and dilated
- Multiple diagnostic studies
 - Cultures and LP (no blood)
 - Skeletal survey – healing fx's of L radius and ulna and small depressed skull fx
 - CT abdomen –fractures spleen

Split Sutures 3

- Child brain dead by following day and pronounced on the second day
- Brought from outlying coroner county for autopsy for “head injury”

Split Sutures 4

- Autopsy findings
 - Contusion of spleen
 - Healing fractures, left radius and ulna
 - Massively split sutures
 - Brain death
 - Focal necrosis of cervical spinal cord
 - Hemorrhage in optic nerve sheath

Split Sutures 5

Autopsy findings

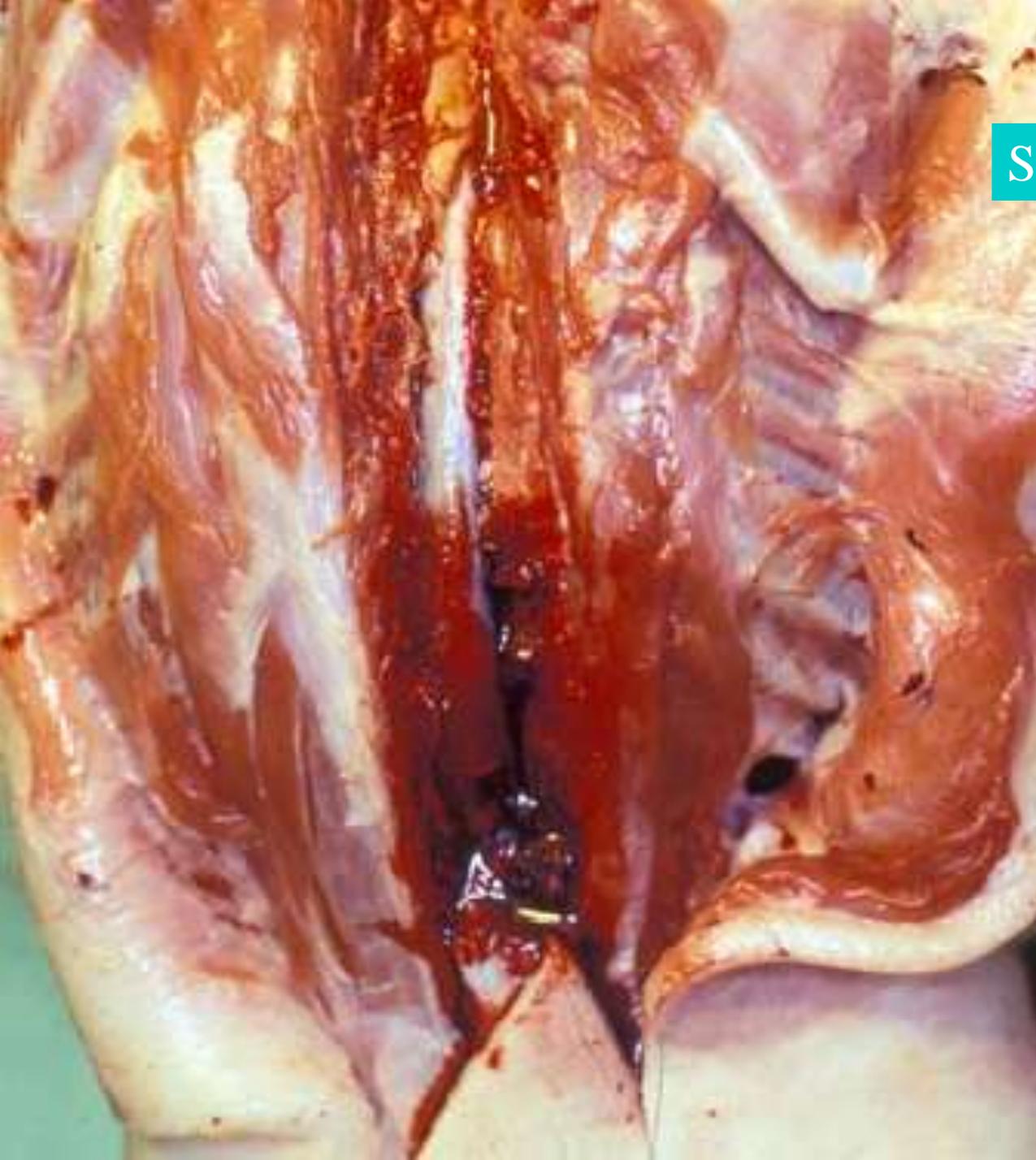
contusion of spleen





Healing fractures of left
ulna and radius

Soft tissue of back

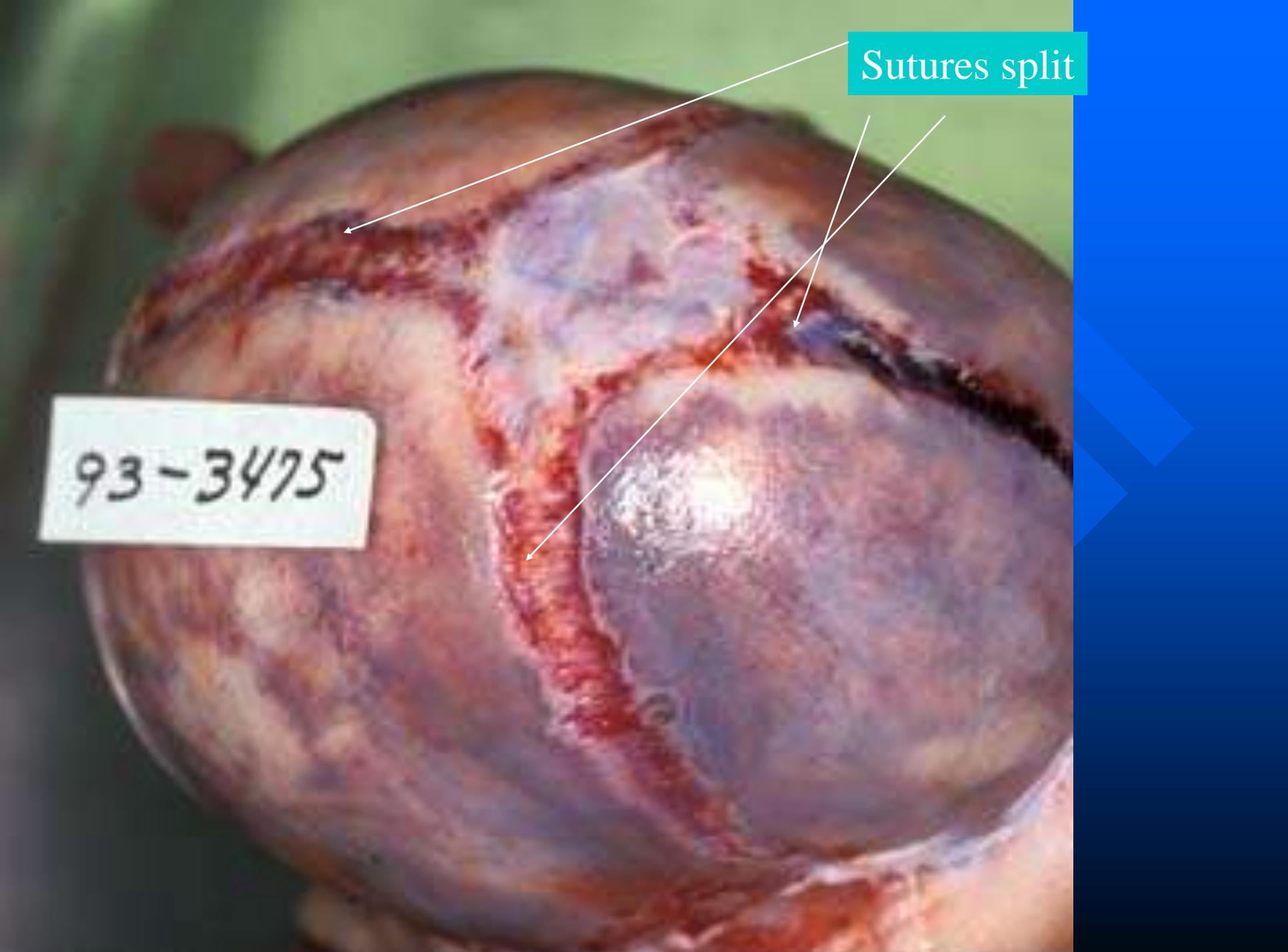




Split sutures

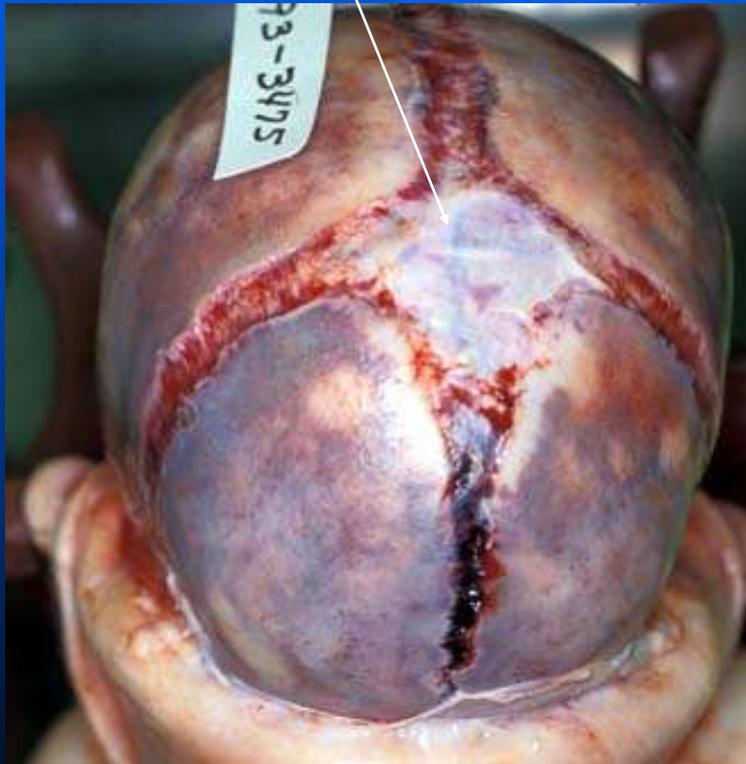
93-3475

Sutures split



Split Sutures 6

massively split sutures



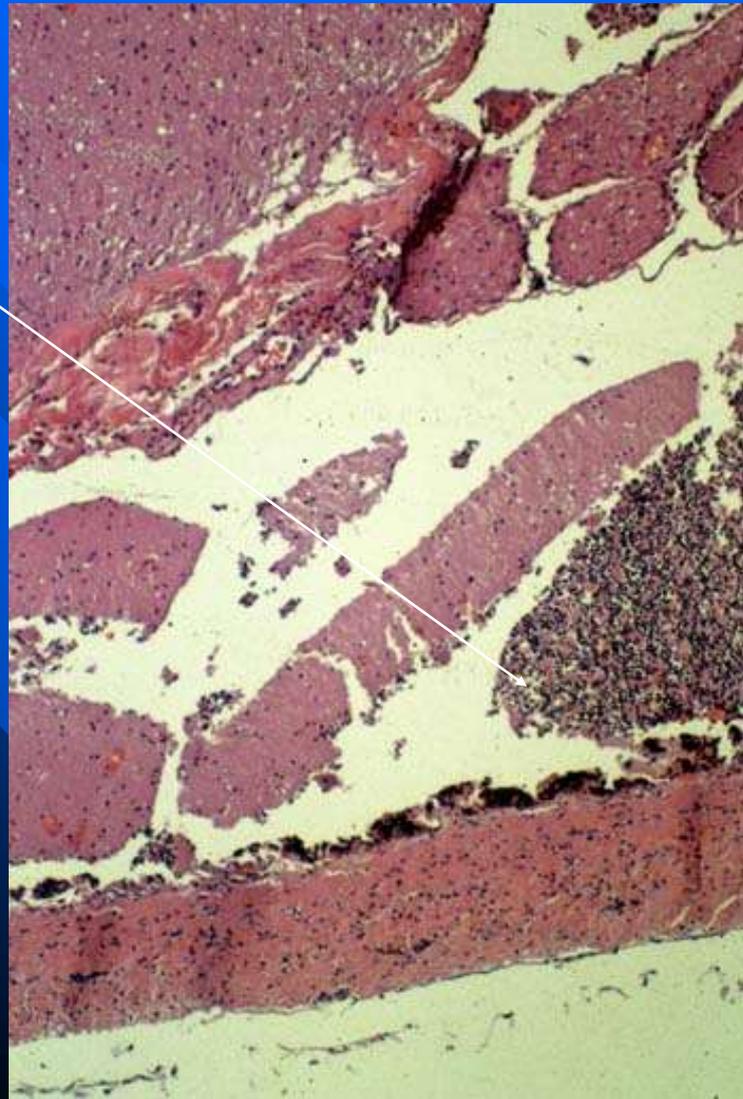
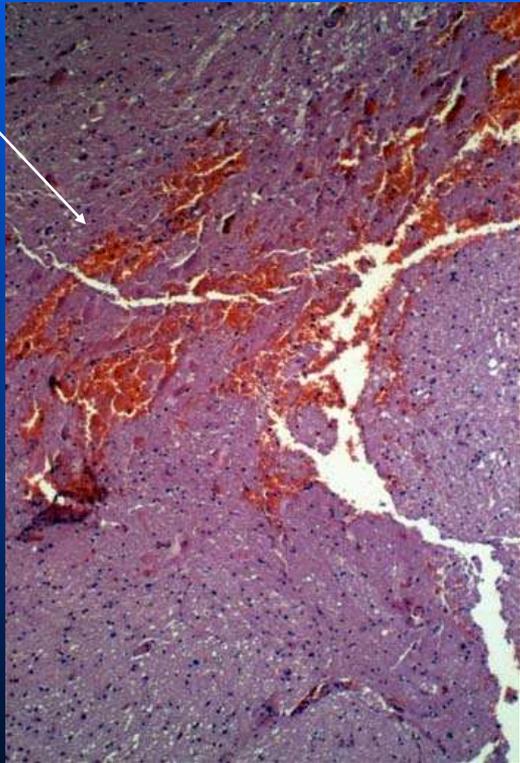
hemorrhage in cervical cord



Split Sutures 7

cerebellum in SAS

hemorrhage in cervical cord



Optic nerve sheath hemorrhage



Split Sutures 7

- COD initially was Undetermined and MOD was Undetermined
- The rest of the story unfolds – mom's boyfriend was with child when he became unresponsive – 4 yr old sibling also present when EMS arrives to attend infant
- 4 yr old tells story of sexual abuse by boyfriend

Split sutures 8

- Mom's boyfriend is arrested and goes to jail
- Cellmate tells police he wants to be moved to another cell
- Cellmate describes boyfriend's confession of killing child by "choking" until unconscious – also admitted to kicking child
- COD – asphyxiation – MOD - Homicide

Split sutures 9

■ Issues from case

- Split sutures – can be misdiagnosed as fx or as injury themselves also issue of how long
- Optic nerve sheath hemorrhage
- Artifact from brain death

Artifact from Brain Death

- Brain dead brains - very soft and easily fragment
- Fragments of cerebellum fall down into SA space of cervical cord
- Compress subpial vessels - ischemia of cord
- Resembles cord contusion

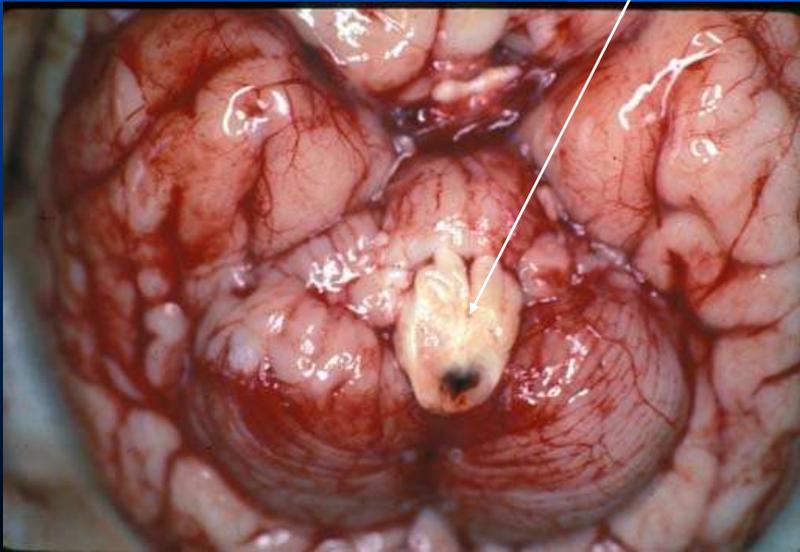
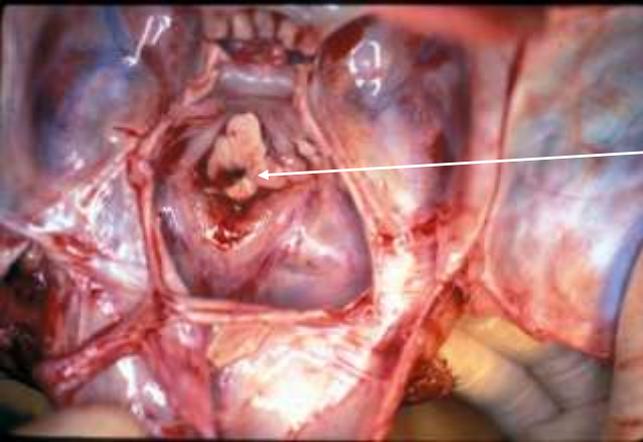
Artifact from Brain Death 2



brain dead brain
tonsillar softening

Distraction Injury

cervical cord contusion



Distraction Injury

- cervical cord contusion

