

# 大血管損傷

高度救命救急センター

松田 真輝

# 大血管損傷

- 胸部大動脈
- 腹部大動脈
- 腸骨動脈
- 鎖骨下動脈
- 腹腔動脈
- 上腸間膜動脈
- 腎動脈
- 主肺動脈
- 肺動脈

- 上大靜脈
- 下大靜脈
- 總腸骨靜脈
- 鎖骨下靜脈
- 內頸靜脈
- 無名靜脈
- 腎靜脈

# 大血管損傷

- 胸部大動脈
- 腹部大動脈
- 腸骨動脈
- 鎖骨下動脈

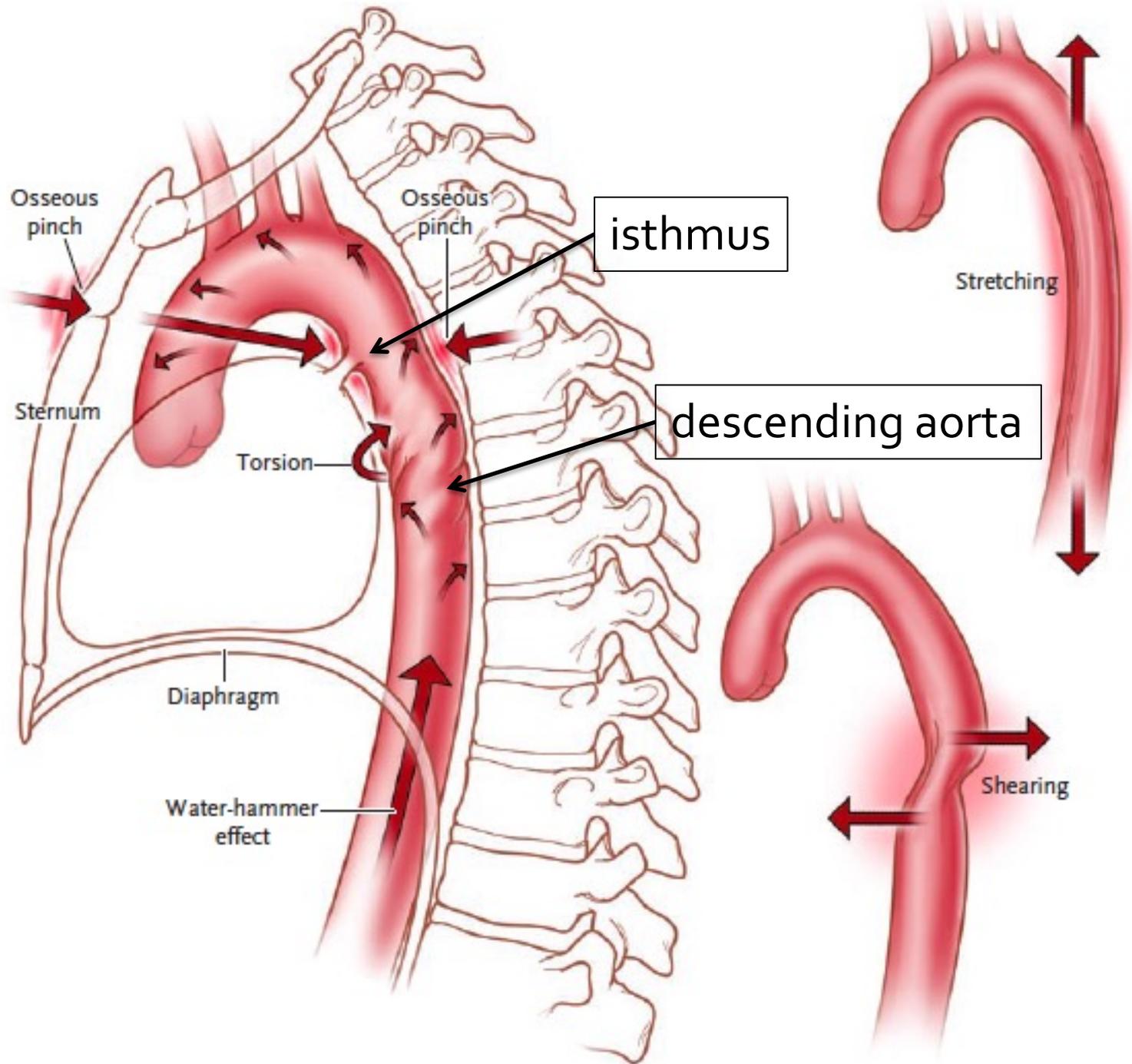
- 腹腔動脈
- 上腸間膜動脈
- 腎動脈
- 主肺動脈
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- 內頸靜脈
- 無名靜脈
- 腎靜脈

鈍的胸部大動脈損傷

Blunt Thoracic Aortic Injury(BTAI)



# JATECでは？

- Secondary surveyで言及されている。
- CTでの診断
- ステントグラフトの有用性

# BTAI



small pseudoaneurysm

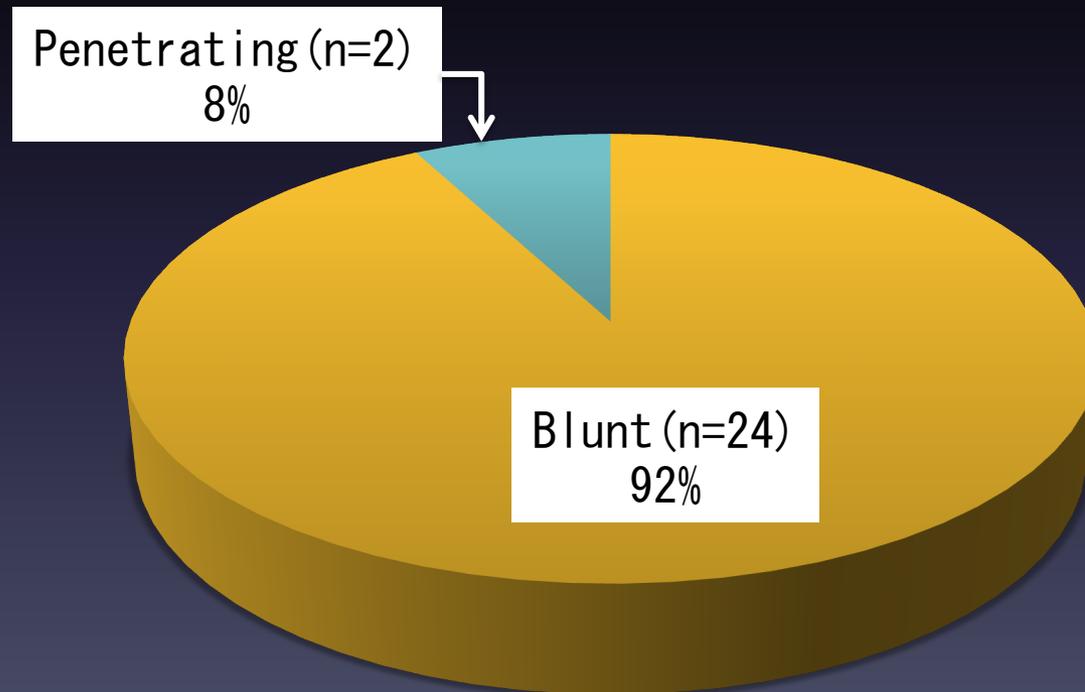


Intramural hematoma

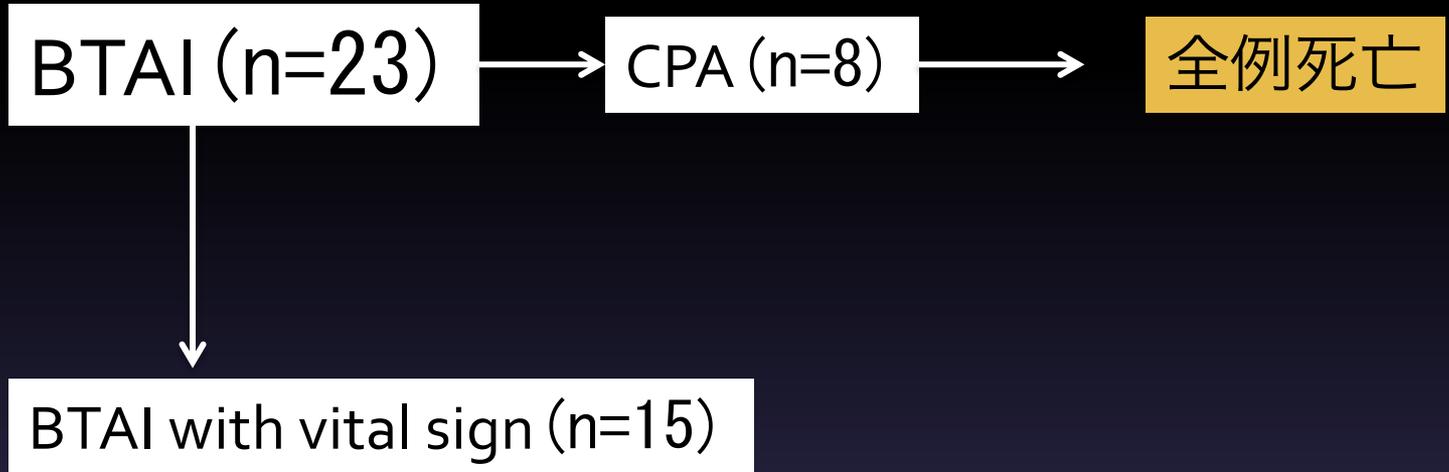
# 当院での胸部大動脈損傷

期間：2005～2014年の9年間

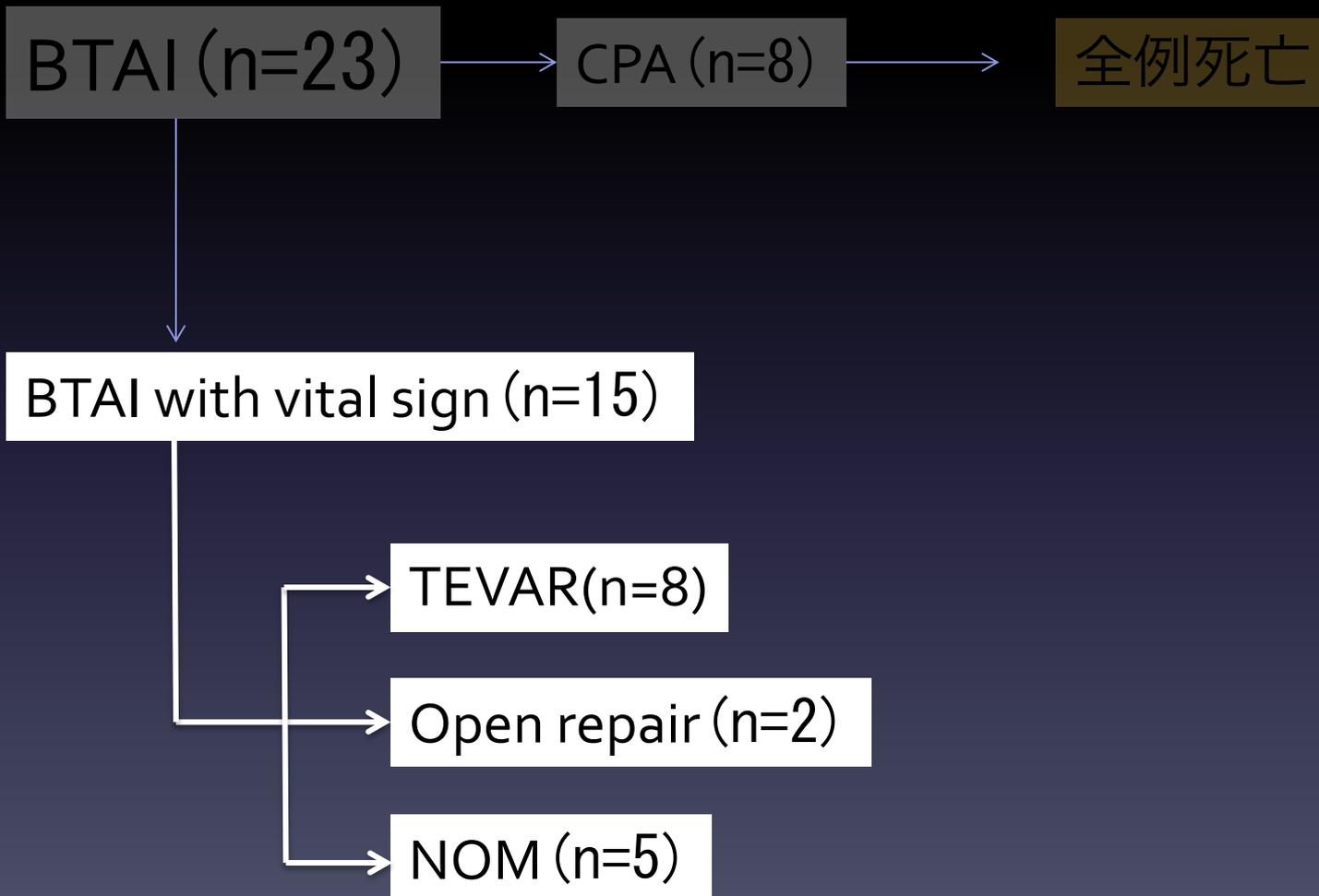
対象：26例



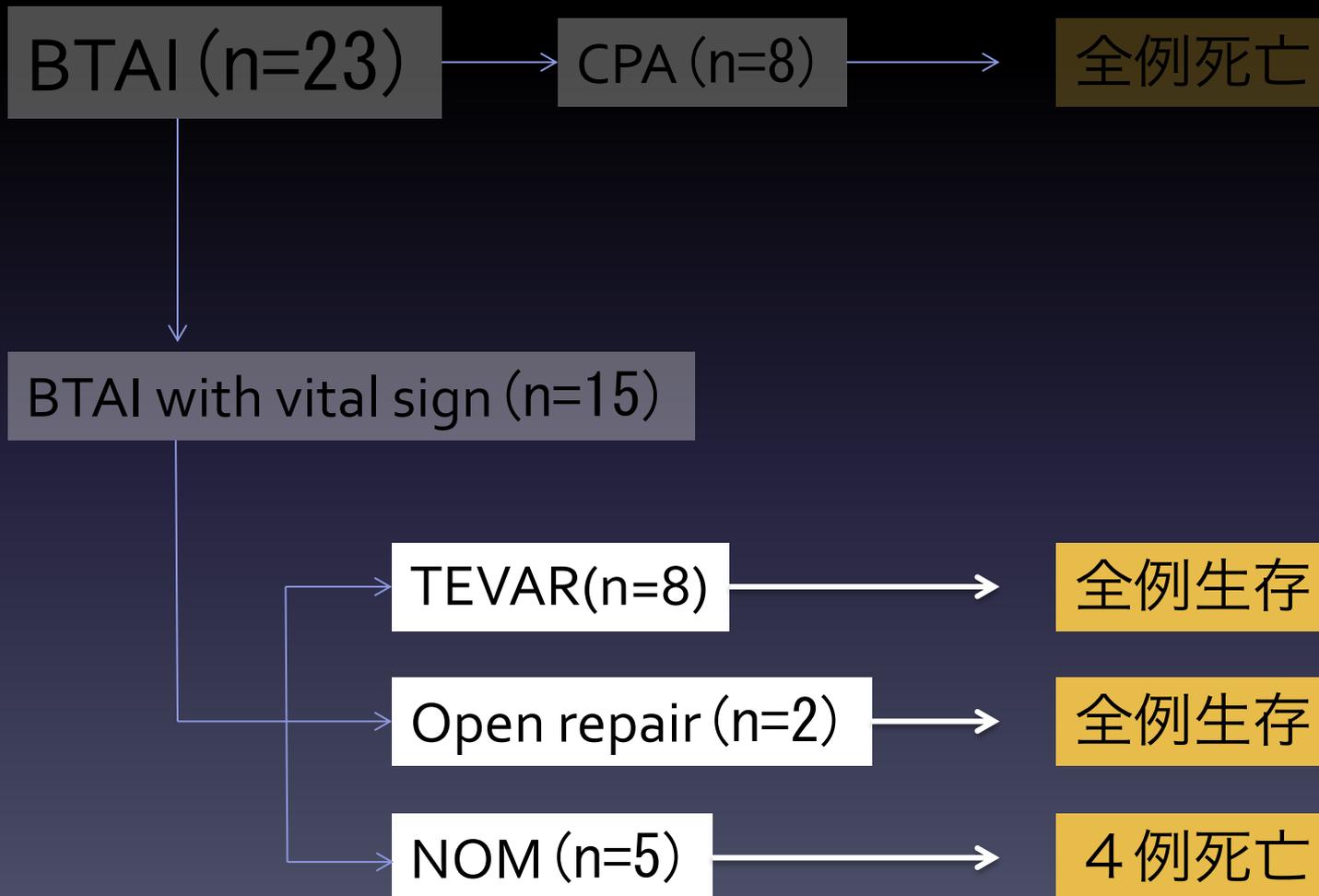
# 当院のBTAI



# 当院のBTAI



# 当院のBTAI



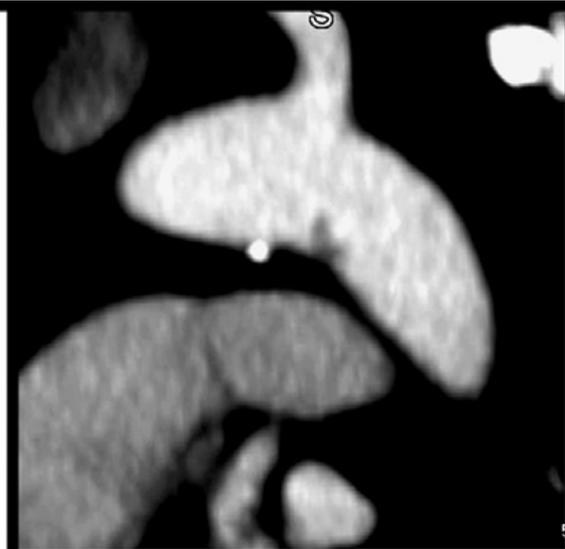
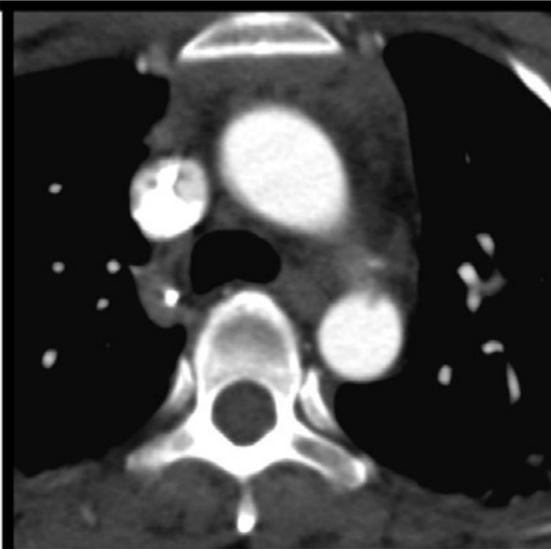
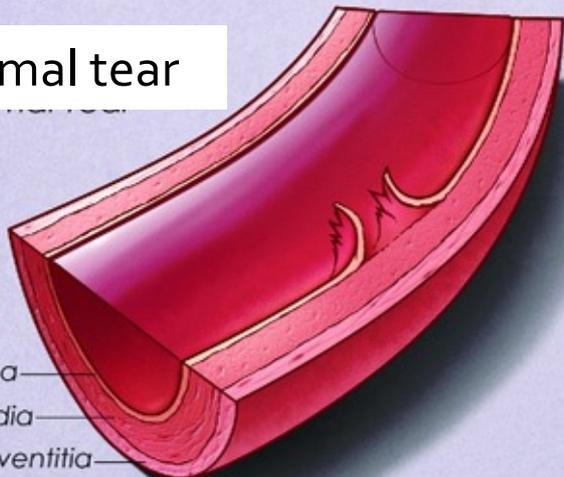
# Grade分類

- intimal tear/flap
- intramural hematoma
- small pseudoaneurysm
- large pseudoaneurysm
- rupture

# intimal tear

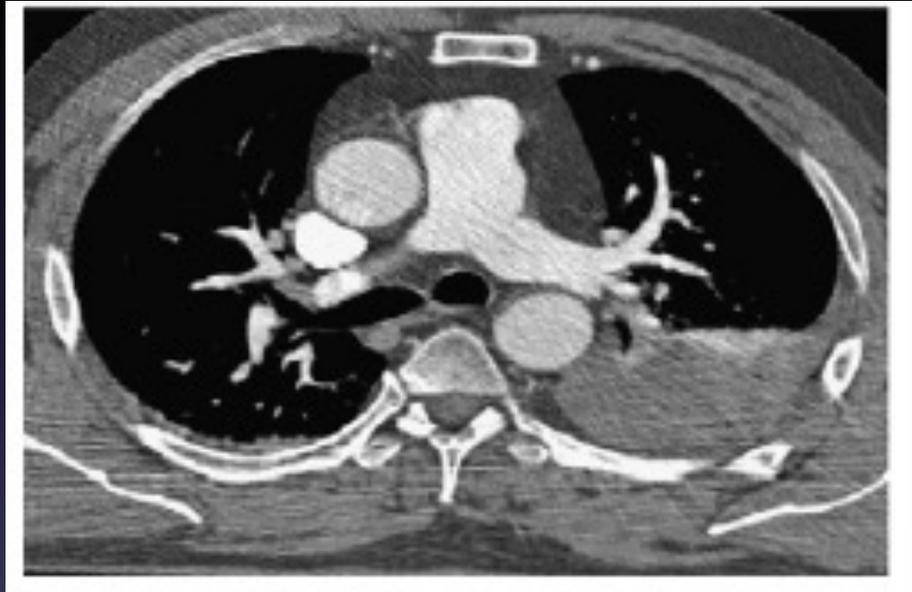
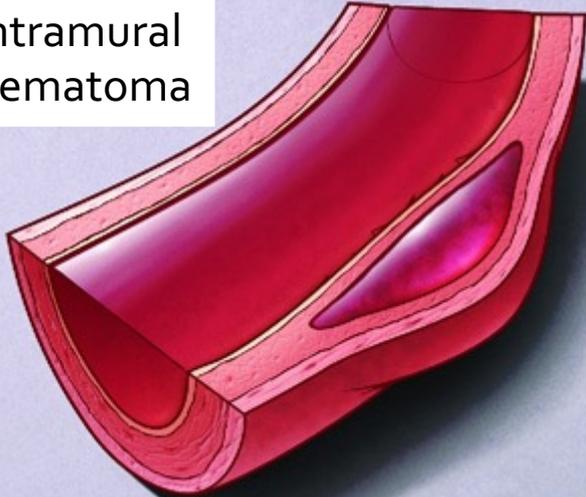
Intimal tear

Intima  
Media  
Adventitia



# intramural hematoma

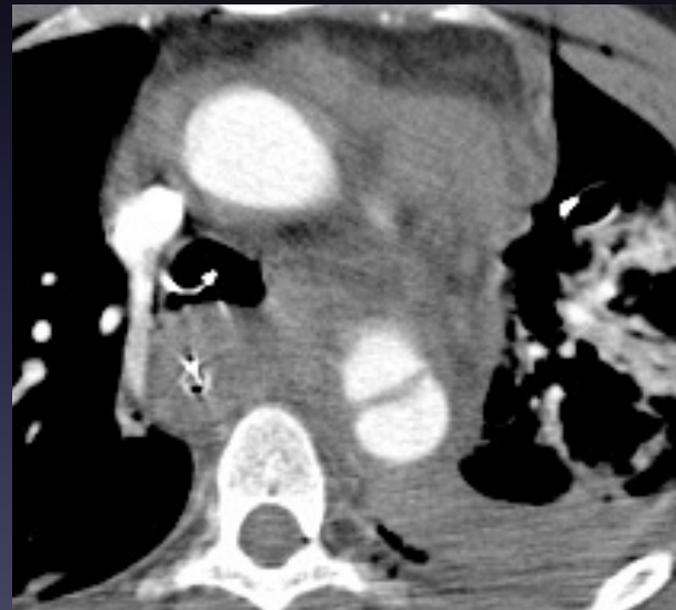
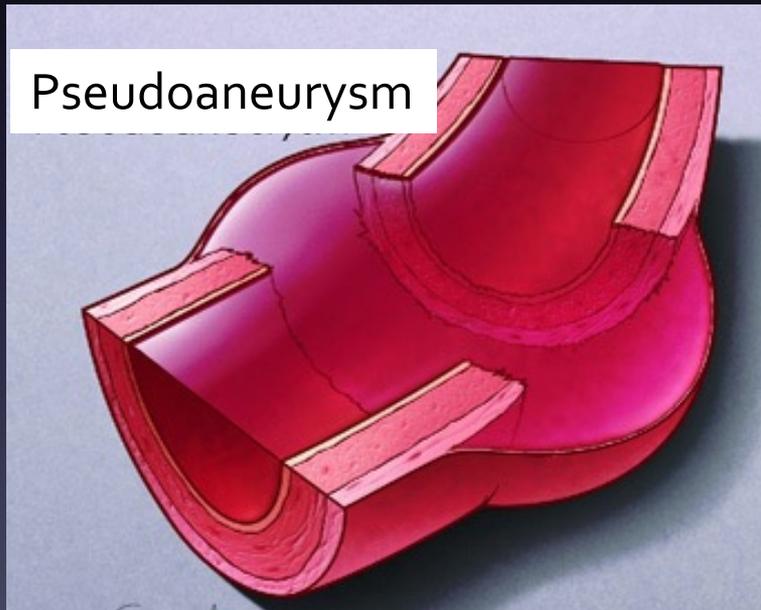
Intramural  
hematoma



# pseudoaneurysm

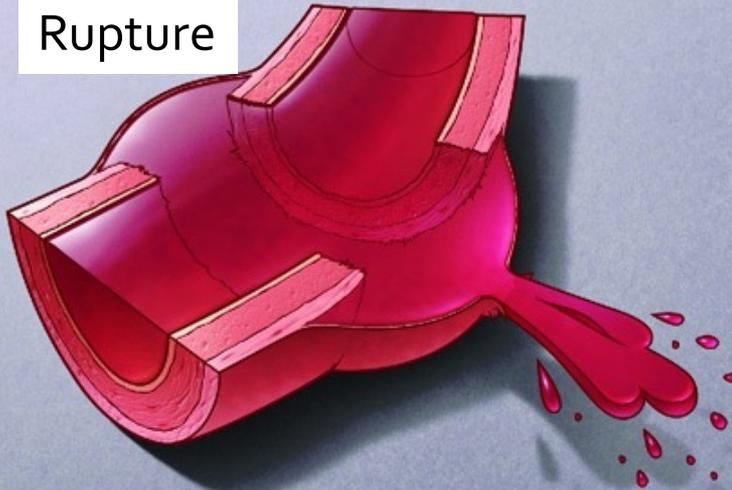
small pseudoaneurysm : less than 50% circumference

large pseudoaneurysm : more than 50% circumference



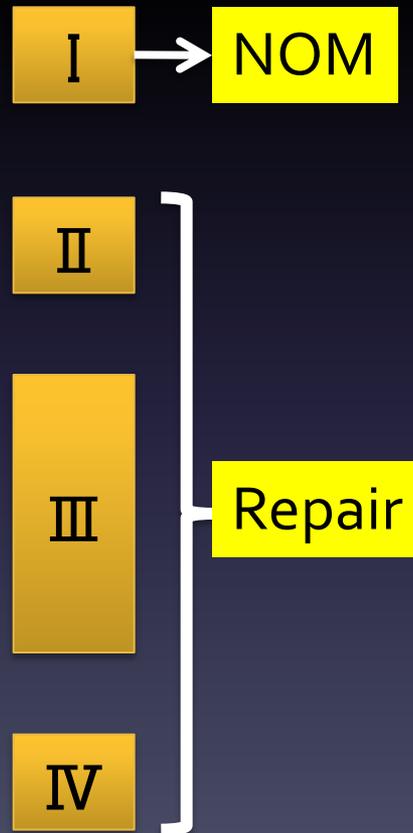
# rupture

Rupture



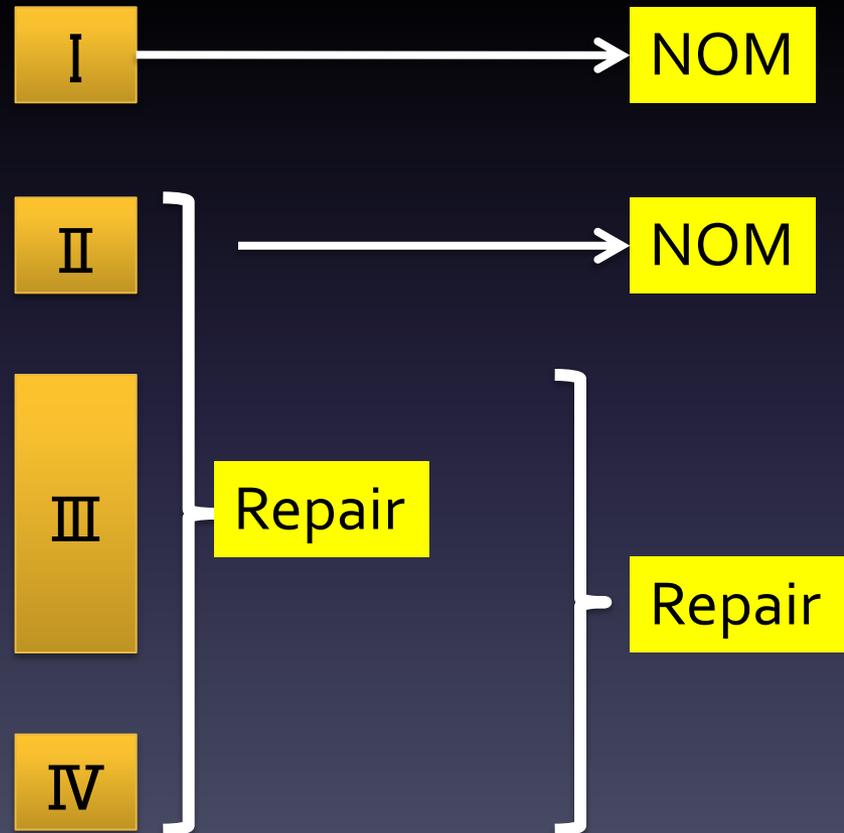
# Grade分類

- intimal tear/flap
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- rupture



# Grade分類

- intimal tear/flap
- intramural hematoma
- small pseudoaneurysm
- large pseudoaneurysm
- rupture



# Grade分類

- intimal tear/flap

I

I



NOM

- intramural hematoma

II

II



?

- small pseudoaneurysm

III

III



Repair

- large pseudoaneurysm

IV

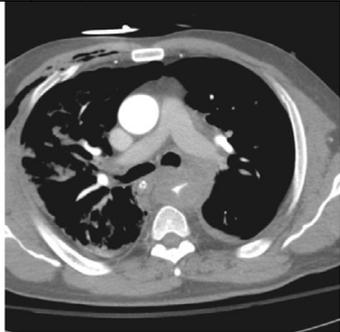
IV

- rupture

# Secondary Signs of Injury

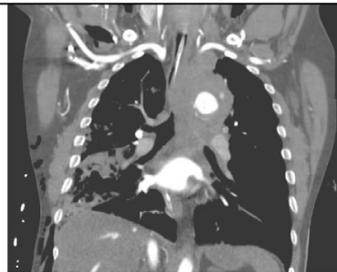
## Secondary Signs of Injury

Pseudocoarctation



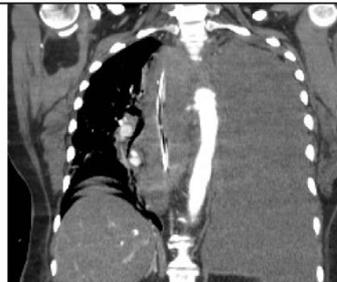
pseudocoarctation

Mediastinal hematoma



mediastinal hematoma  
with mass effect

Large left hemothorax



Large left hemothorax

evolution

# 当院の方針

# Grade分類

- intimal tear/flap
- intramural hematoma
- small pseudoaneurysm
- large pseudoaneurysm
- rupture

I	I
II	I
III	II
III	III
IV	IV

# Grade分類

- intimal tear/flap
- intramural hematoma
- small pseudoaneurysm
- large pseudoaneurysm
- rupture

I

II

III

IV

I

II

III

IV

# Grade分類

- Grade I

intimal tear

intamural hematoma

- Grade II

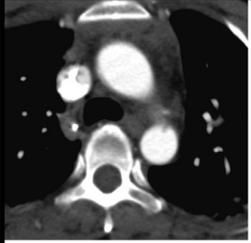
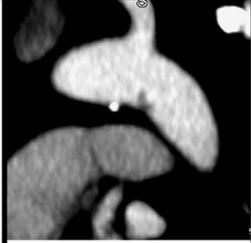
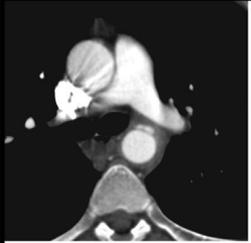
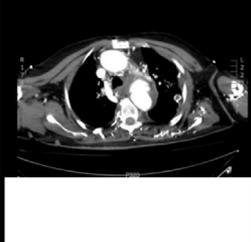
small pseudoaneurysm

- Grade III

large pseudoaneurysm

- Grade IV

rupture

Grades of Aortic Injury			
Grade I	Intimal tear or intramural hematoma		
Grade II	Small pseudoaneurysm (less than 50% circumference)		
Grade III	Large pseudoaneurysm (more than 50% circumference)		
Grade IV	Rupture or transection		

# Secondary Signs of Injury

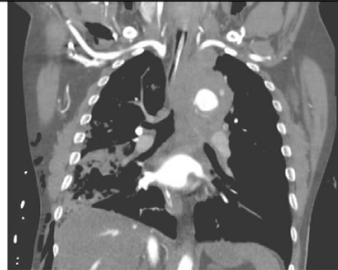
## Secondary Signs of Injury

Pseudocoarctation



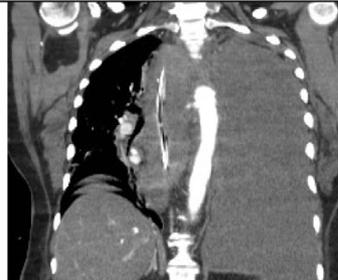
pseudocoarctation

Mediastinal hematoma



mediastinal hematoma  
with mass effect

Large left hemothorax



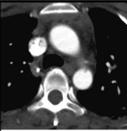
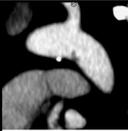
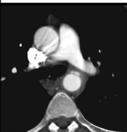
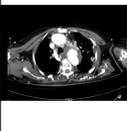
Large left hemothorax

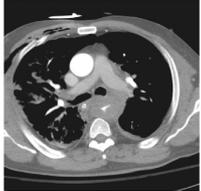
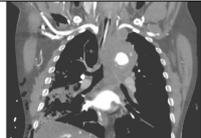
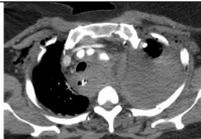
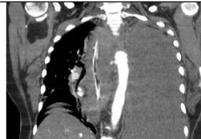
# 治療方針

Grade



SSI

Grade I	Intimal tear or intramural hematoma		
Grade II	Small pseudoaneurysm (less than 50% circumference)		
Grade III	Large pseudoaneurysm (more than 50% circumference)		
Grade IV	Rupture or transection		

Pseudocoarctation		
Mediastinal hematoma		
Large left hemothorax		

# 治療方針

Grades of Aortic Injury	
Grade I	Intimal tear or intramural hematoma
Grade II	Small pseudoaneurysm (less than 50% circumference)
Grade III	Large pseudoaneurysm (more than 50% circumference)
Grade IV	Rupture or transection

Grade I

Non-Operative Management

Grade II

Tight Follow-up Algorithm

Grade III

TEVAR/Open repair  
➡心臓外科コンサルト

Grade IV

# 治療方針

Grades of Aortic Injury	
Grade I	Intimal tear or intramural hematoma
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Grade I

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Grade IV

# 治療方針

```
graph TD; A([SSI(+)]) --> B([Repair]);
```

SSI(+)

Repair

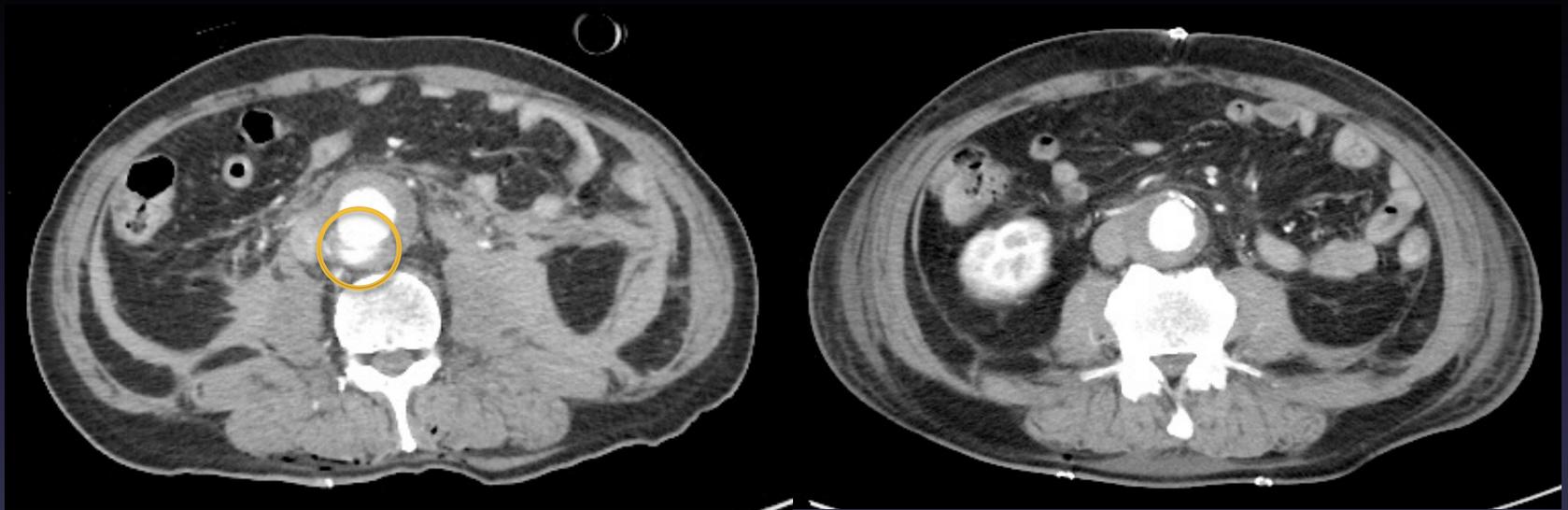
# Tight Follow-up Algorithm

- small pseudoaneurysmについてはcontroversial
- 通常はrepairが必要とされている。
- 具体的な方針を定めている施設はない。

# Tight Follow-up Algorithm

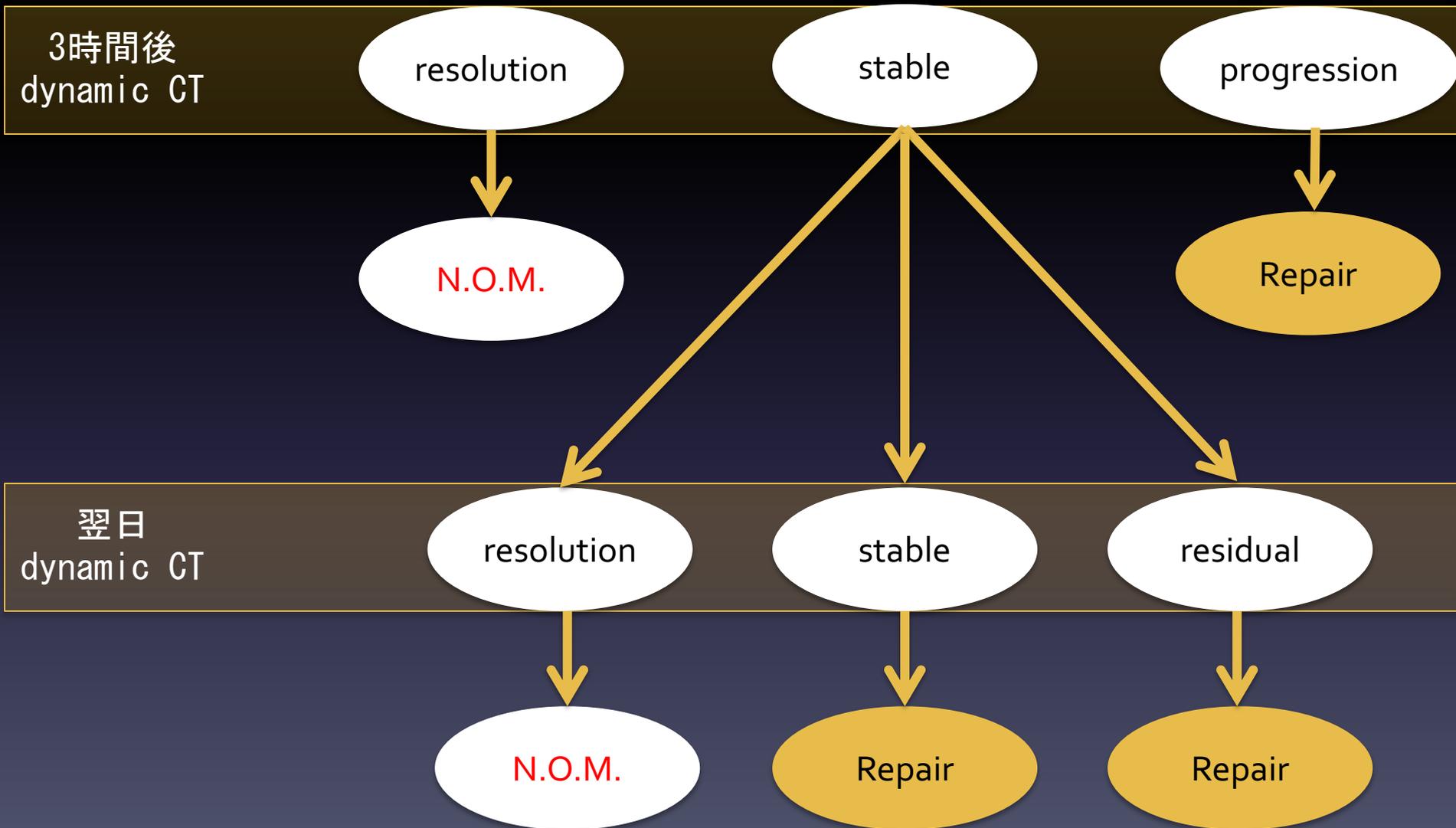
- これまではTEVARが行われてきた。
- 実施するまでには時間がかかる。
- CT頻回follow upしている報告はない。

# NOM



3日後

# small pseudoaneurysm without SSI



# Non Operative Management

- Stanford B 大動脈解離に準じる。
- $\beta$ -blockade therapy
- sBP: 100~120mmHg, MAP: <80mmHg
- HR: 60~80/min

# anti-platelet therapy

- NOMと判断した段階で開始を検討する。
- 他臓器損傷を考慮して開始する。

# CQ1. 血管造影は必要？

基本的には必要なし。

CT angioで十分な情報が得られる。

# CQ2. 初療室での注意点は？

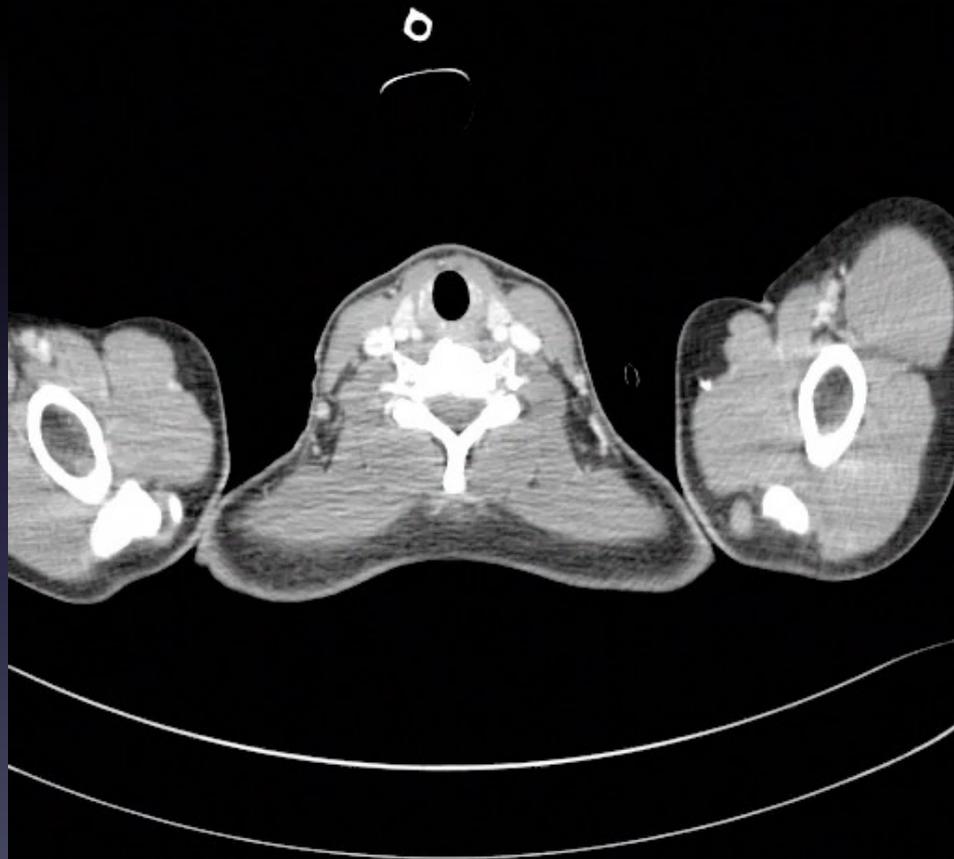
~~Aシース/Vシース  
鼠径部からの採血~~

ただし、他部位の損傷でTAE等が必要な場合は慎重に留置する

A-lineは右橈骨動脈から留置

CTは多角的にみる

# BTAI



# BTAI



# CQ3. TEVARの成績は？

	Open repair	TEVAR
死亡率	0～55%	0～12%
対麻痺	0～12%	0%
合併症	ARDS 意識障害 神経学的合併症	左鎖骨下動脈閉塞 グラフト圧排 刺入部の合併症

何か質問はありますか？

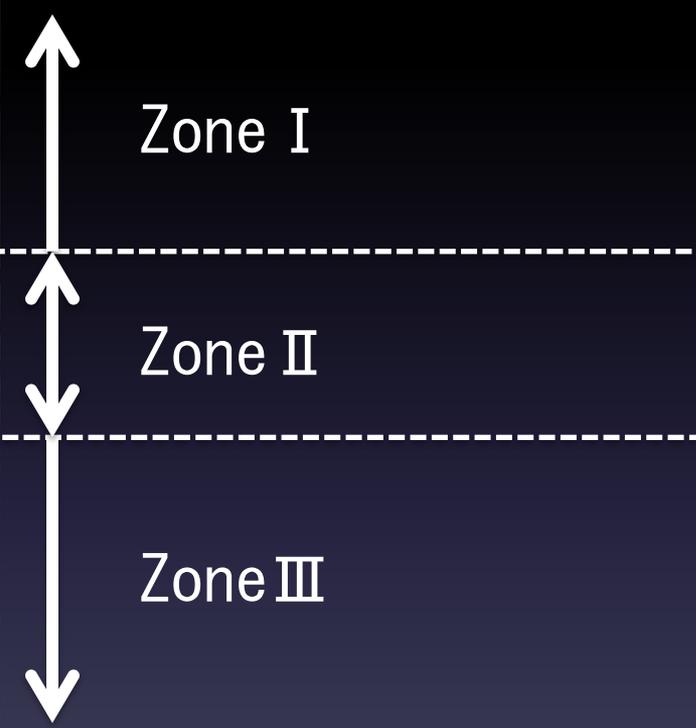
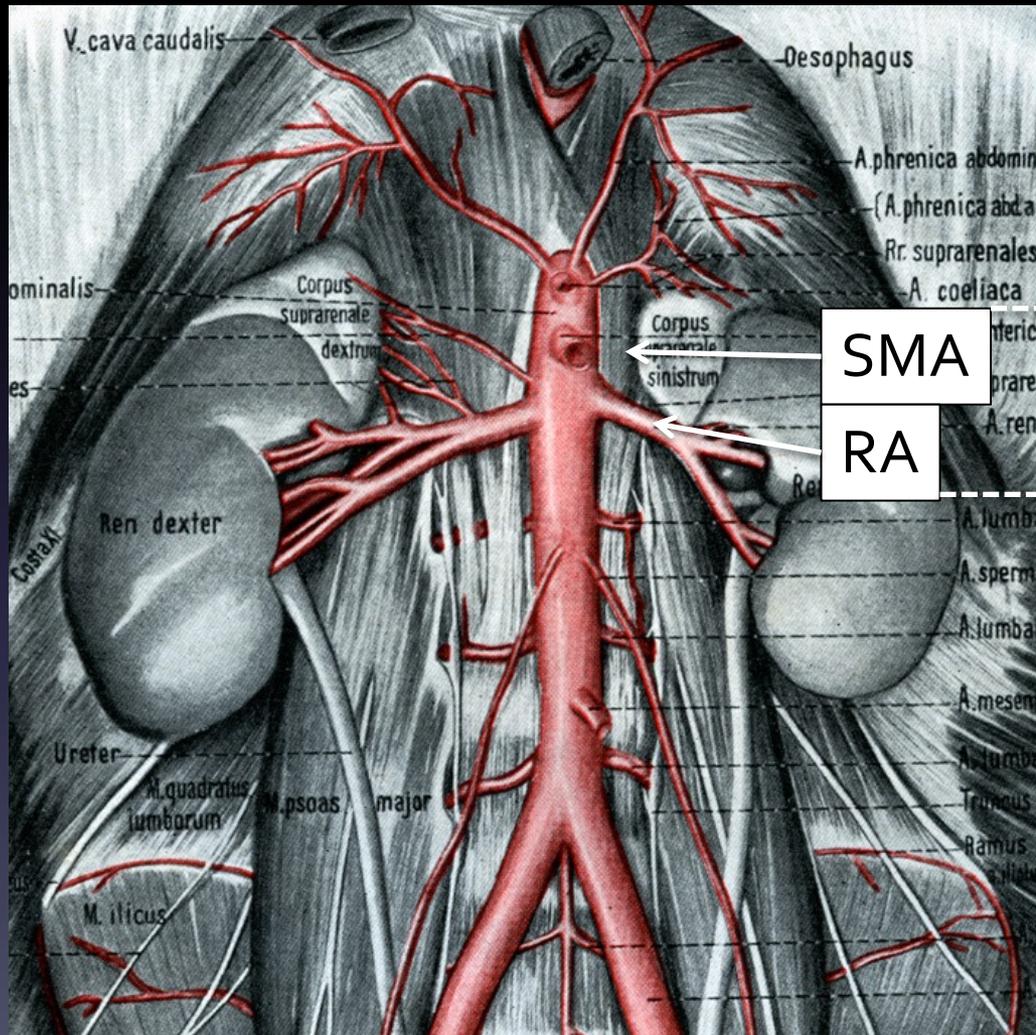
鈍的腹部大動脈損傷

Blunt Abdominal Aortic Injury(BAAI)

# 腹部大動脈損傷

- 症例数は少ない。
- まとまったreviewも少ない。
- 症例報告レベルがほとんど。

# 腹部大動脈損傷



# Grade分類

- Grade I

Intimal tear

Intamural hematoma

- Grade II

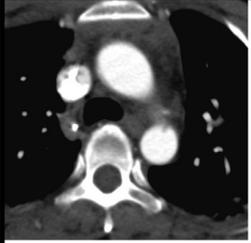
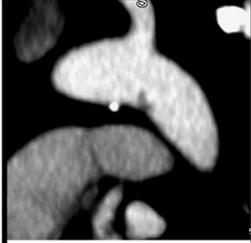
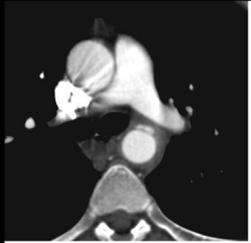
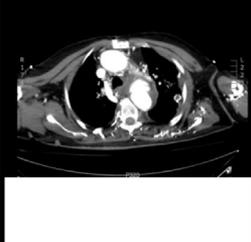
small pseudoaneurysm

- Grade III

large pseudoaneurysm

- Grade IV

rupture

Grades of Aortic Injury			
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Grade IV	Rupture or transection		

# 当院での腹部大動脈損傷症例

- 期間：2005～2014年の9年間
- 対象：7例
- 鈍的：5例、鋭的：2例
- 全例でOpen repair

# 治療方針

Grade I



N.O.M

Grade II / III / IV  
(pseudoaneurysm以上)



Open  
repair

# 銳的大動脈損傷

## Penetrating Aortic Injury

手術

鎖骨下動脈損傷

Subclavian Artery Injury

# 鎖骨下動脈損傷

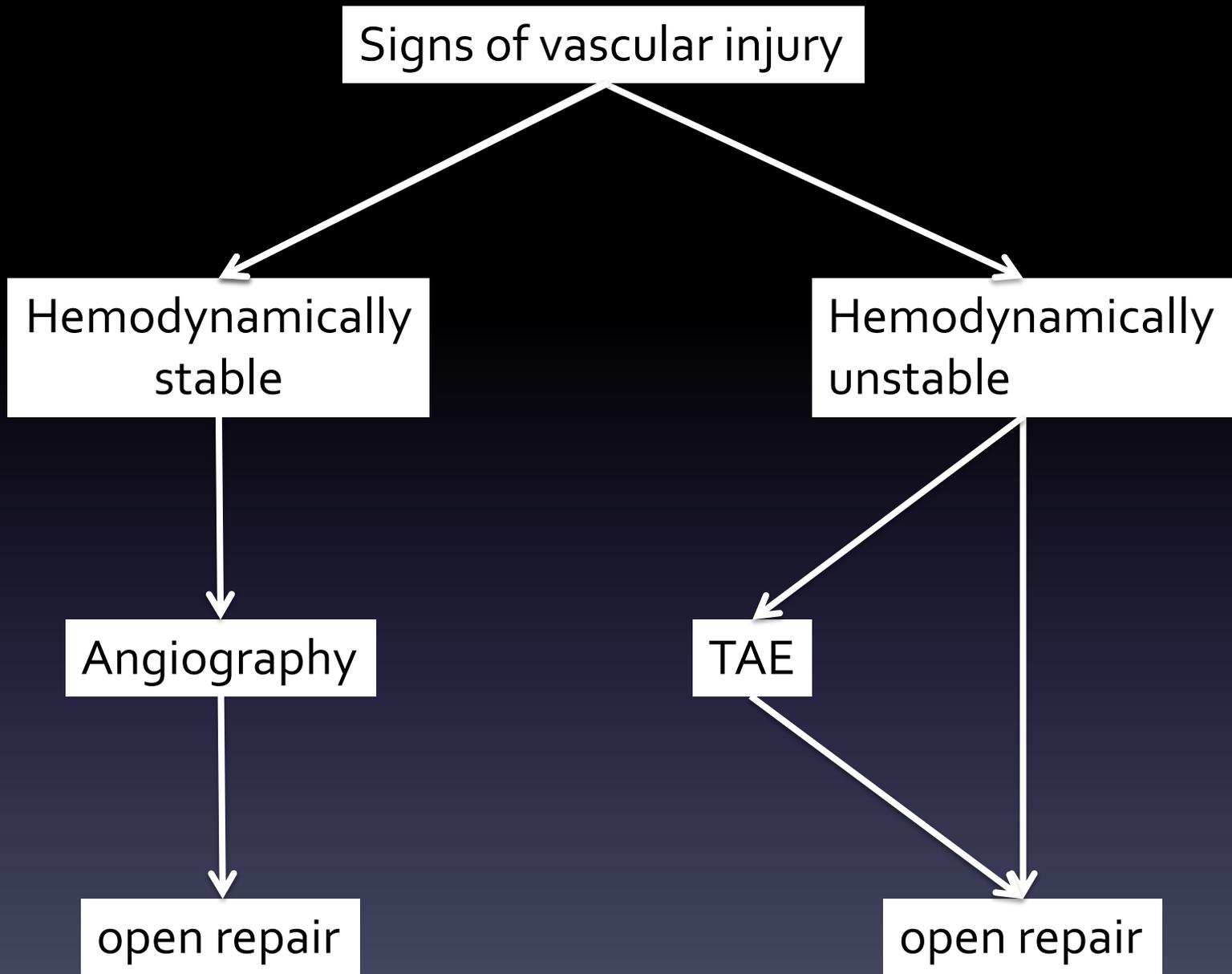
鎖骨骨幹部骨折

上位肋骨骨折  
inlet rib fracture

# 当院での鎖骨下動脈損傷症例

- 2005～2014年の9年間で5例
- 全例が鈍的外傷
- open repairが施行されている

# 当院の方針



Algorithm for the management of subclavian artery injury

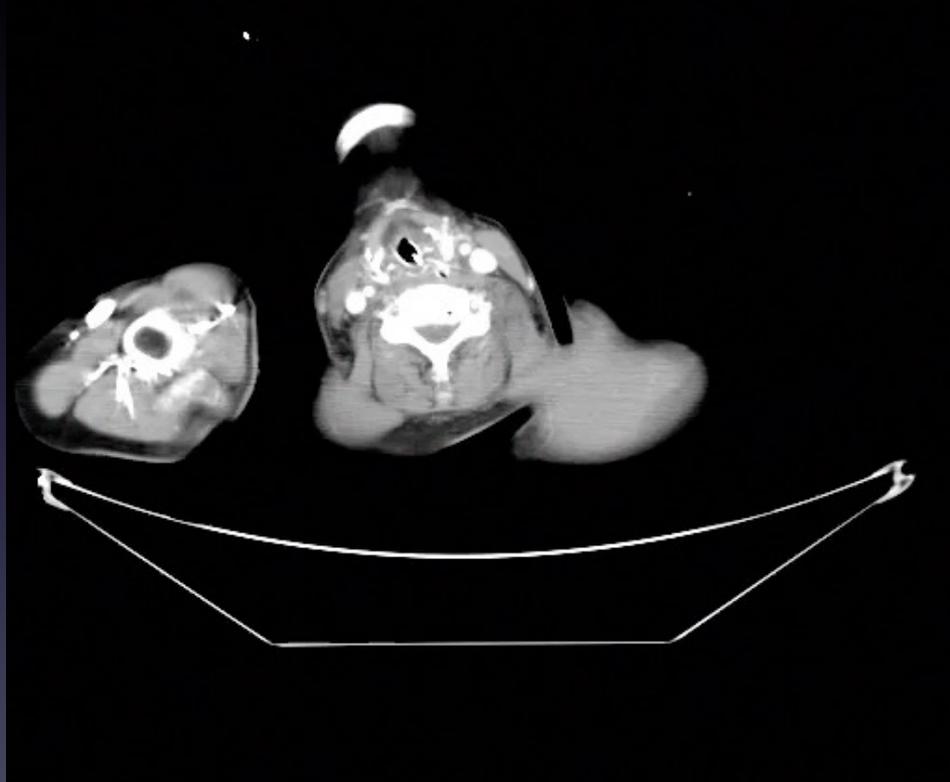
# TAEについて

- 時間的余裕がない時、外科医不在などに考慮
- **Total occlusion or balloon occlusion**で止血
- 後に血行再建を行う。

# 鎖骨下動脈損傷

- 海外の報告例はpenetrating injuryが多い。
- 日本では鈍的外傷がほとんど。
- CTでの診断は難しい。

# 鎖骨下動脈損傷



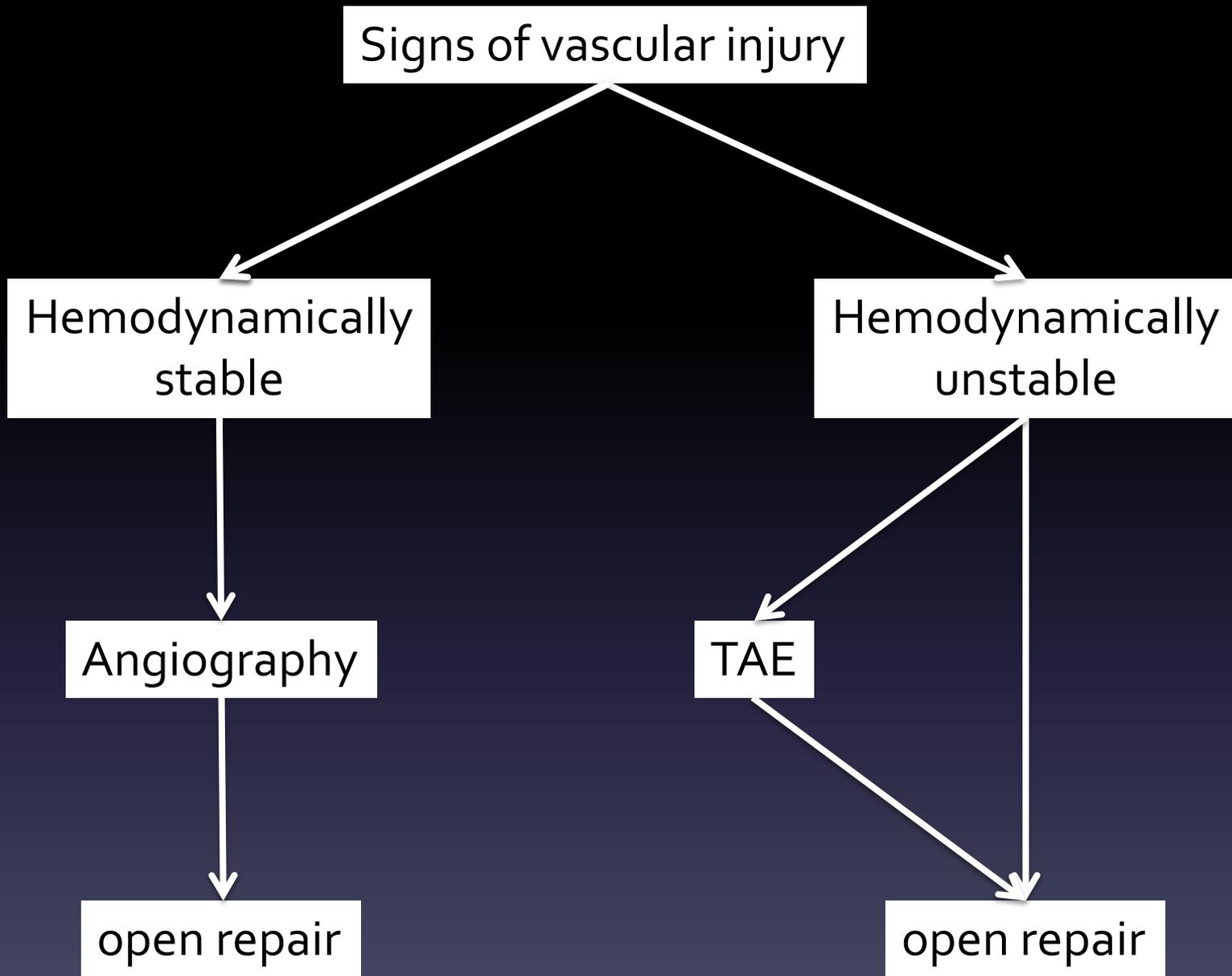
何か質問はありますか？

腸骨動脈損傷

Iliac Artery Injury

# 当院での腸骨動脈損傷症例

- 2005～2014年の9年間で4例
- 全例が鈍的外傷

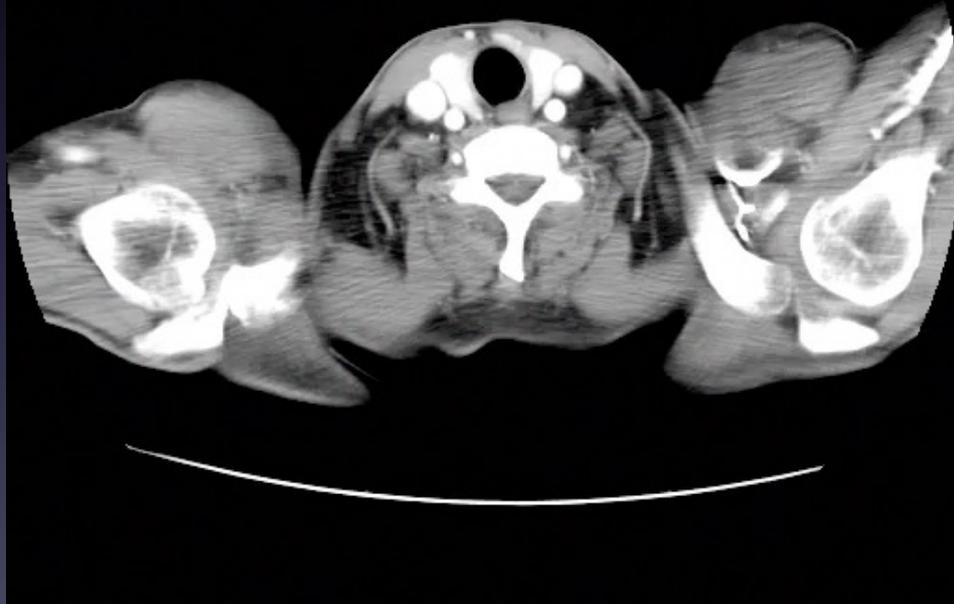


Algorithm for the management of iliac artery injury

# 腸骨動脈損傷

- 鎖骨下動脈損傷と同等の考えでよい
- TAEで完全にemboliしても、後でバイパスすればよい。

# 腸骨動脈損傷



# CQ. 1 Endovascular Artery Repair (EVAR) の現状は？

- Covered stentは胸部大動脈、腹部大動脈のみに限られている。
- それ以外ではopen repairしかできないのが現状。



何か質問はありますか？