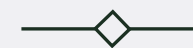


MIDNIGHT
JOURNAL CLUB
9TH MAY 2022



大阪府済生会千里病院
千里救命救急センター
伊藤 裕介

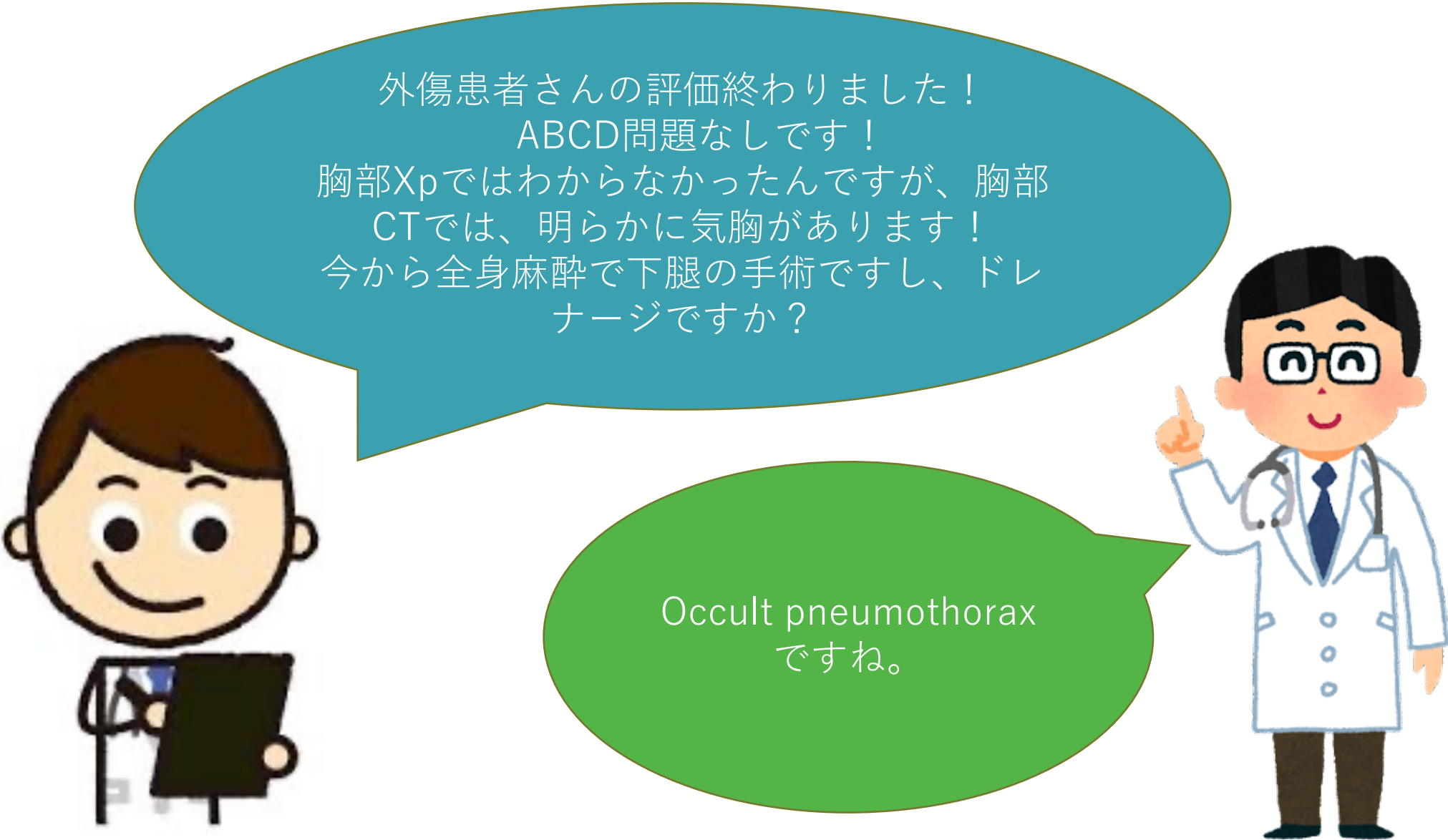
Midnight Journal Club

- 第1, 2, 3月曜20時より開催
- サブスペシャリティを持つスタッフがその専門領域のup to dateな内容を提示
- ちょっとした小ネタ集で可
- 明日からのdecision makingに使えるものを
- 調べた知識を皆で共有
- もはや脳みそは筋肉ではない！



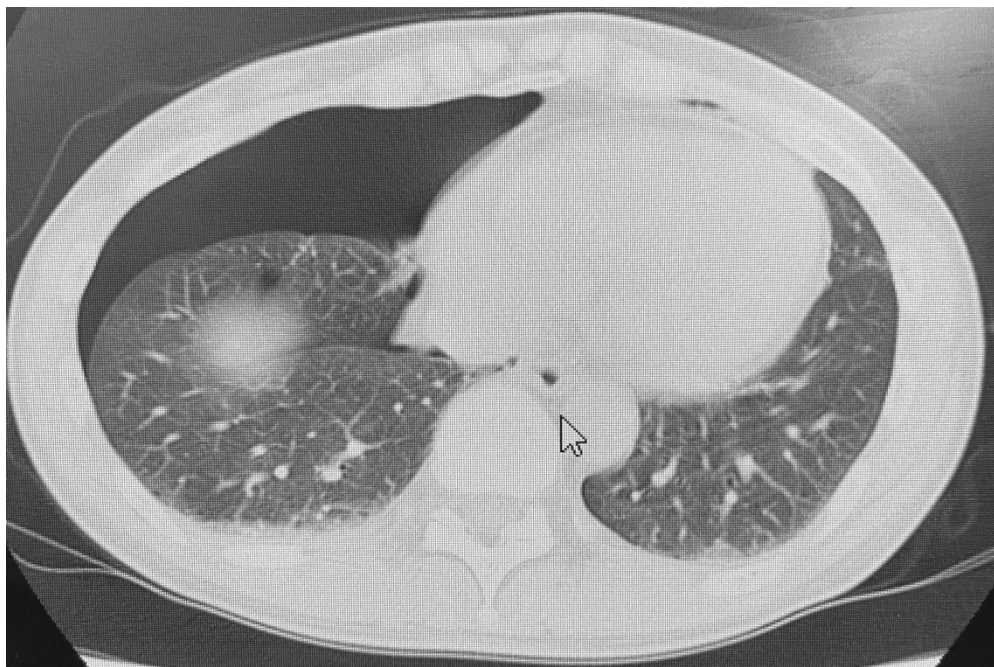
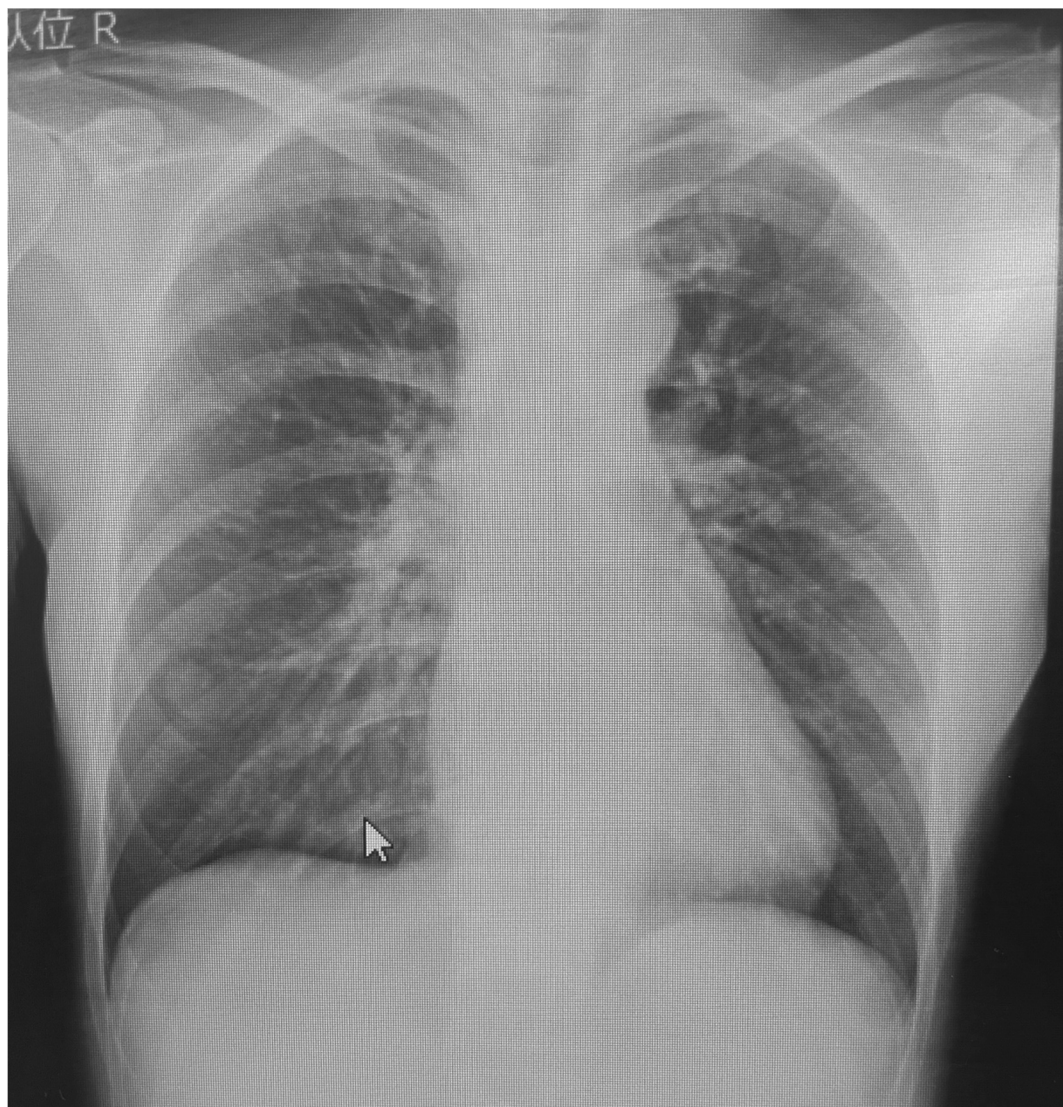
担当表


日時	担当者	専門分野
2022_05_09_20:00	伊藤	外傷/Acute care surgery
2022_05_16_20:00	夏川知輝	循環器/災害医療/集中治療
2022_06_06_20:00	佐藤	外傷整形
2022_06_13_20:00	夏川麻依	小児
2022_06_20_20:00	澤野	集中治療
2022_07_04_20:00	一ノ橋	熱傷
2022_07_11_20:00	橘高	外傷/Acute care surgery
2022_07_18_20:00	秋田	集中治療
2022_08_01_20:00	福田	IVR/集中治療
2022_08_08_20:00	長田	集中治療
2022_08_15_20:00	山田	脳神経外科
2022_09_05_20:00	夏川知輝	循環器/災害医療/集中治療
2022_09_12_20:00	加藤	外傷/Acute care surgery
2022_09_19_20:00	夏川麻依	小児



外傷患者さんの評価終わりました！
ABCD問題なしです！
胸部Xpではわからなかったんですが、胸部
CTでは、明らかに気胸があります！
今から全身麻酔で下腿の手術ですし、ドレ
ナーはですか？

Occult pneumothorax
ですね。






胸腔ドレーンを入れる
目安なんか
あったらいいのにな。。



脳筋は卒業しましょう。



やばいと思ったら
入れたらいい
んだよ！！

本日の論文

Evaluation and management of traumatic pneumothorax: A Western Trauma Association critical decisions algorithm

Marc de Moya, MD, Karen J. Brasel, MPH, MD, Carlos V.R. Brown, MD, Jennifer L. Hartwell, MD, Kenji Inaba, MD, Eric J. Ley, MD, Ernest E. Moore, MD, Kimberly A. Peck, MD, Anne G. Rizzo, MD, Nelson G. Rosen, MD, Jason Sperry, MPH, MD, Jordan A. Weinberg, MD, and Matthew J. Martin, MD, Milwaukee, Wisconsin

(PTX). The current algorithm and recommendations are based on available published prospective cohort, observational, and retrospective studies and the expert opinion of the Western Trauma Association members. The literature was reviewed after a search

Background

- 歴史的に外傷性気胸の治療は太い胸腔ドレーンの挿入であった。
- CTの普及に伴いoccult pneumothoraxや小さい気胸が見られるようになりドレーンの挿入の是非・ドレーンの太さなどに変化が起こった。
- 胸腔ドレーン挿入による合併症の発生率は20%にも及び適切な患者に挿入することが必要である。

Chan L, Reilly KM, Henderson C, Kahn F, Salluzzo RF. Complication rates of tube thoracostomy. *Am J Emerg Med.* 1997;15(4):368–370.
Etoch SW, Bar-Natan MF, Miller FB, Richardson JD. Tube thoracostomy. Factors related to complications. *Arch Surg.* 1995;130(5):521–525; discussion 525-6.

- 気胸の診断には胸部Xpが一般であるが、近年は、CTやエコーによる診断により診断精度が上がっている。

Neff MA, Monk JS Jr, Peters K, Nikhilesh A. Detection of occult pneumothoraces on abdominal computed tomographic scans in trauma patients. *J Trauma.* 2000;49(2):281–285.
Hill SL, Edmisten T, Holtzman G, Wright A. The occult pneumothorax: an increasing diagnostic entity in trauma. *Am Surg.* 1999;65(3):254–258.

Occult pneumothorax

- Occult pneumothoraxの10%近くが保存的に見ることができる

Enderson BL, Abdalla R, Frame SB, Casey MT, Gould H, Maull KI. Tube thoracostomy for occult pneumothorax: a prospective randomized study of its use. *J Trauma*. 1993;35(5):726-729; discussion 729-30.

- 陽圧換気をおこなった29例のoccult pneumothoraxのうち27例（93%）で保存的治療が成功した

Johnson G. Traumatic pneumothorax: is a chest drain always necessary? *J Accid Emerg Med*. 1996;13:173-174.

- 59例のoccult pneumothoraxのうち86%で保存的治療が成功し、そのうち80%が陽圧換気をおこなっていた

Barrios C, Tran T, Malinoski D, Lekawa M, Dolich M, Lush S, Hoyt D, Cinat ME. Successful management of occult pneumothorax without tube thoracostomy despite positive pressure ventilation. *Am Surg*. 2008;74:958-961.

- 陽圧換気と気胸の再発に関連は認めなかった。

Tawil I, Gonda JM, King RD, Marinaro JL, Crandall CS. Impact of positive pressure ventilation on thoracostomy tube removal. *J Trauma*. 2010;68(4):818-821.



陽圧換気をするからといって
胸腔ドレーンを入れる必要はないな

どの症例に胸腔ドレーンを入れる？

- 2012年代にCTによる気胸の容量測定を行い、ドレナージの適応を検討したが、一般性にかげあまり流行らなかった。。。

Cai W, Lee JG, Fikry K, Yoshida H, Novelline R, de Moya M. MDCT quantification is the dominant parameter in decision-making regarding chest tube drainage for stable patients with traumatic pneumothorax. *Comput Med Imaging Graph.* 2012;36:375-386.

- より簡潔で、一般的な方法が考えられ、上記の気胸の容量測定はもはやマイチになった。。。

ORIGINAL RESEARCH

Pneumothoraces on Computed Tomography Scan: Observation using the 35 Millimeter Rule is Safe

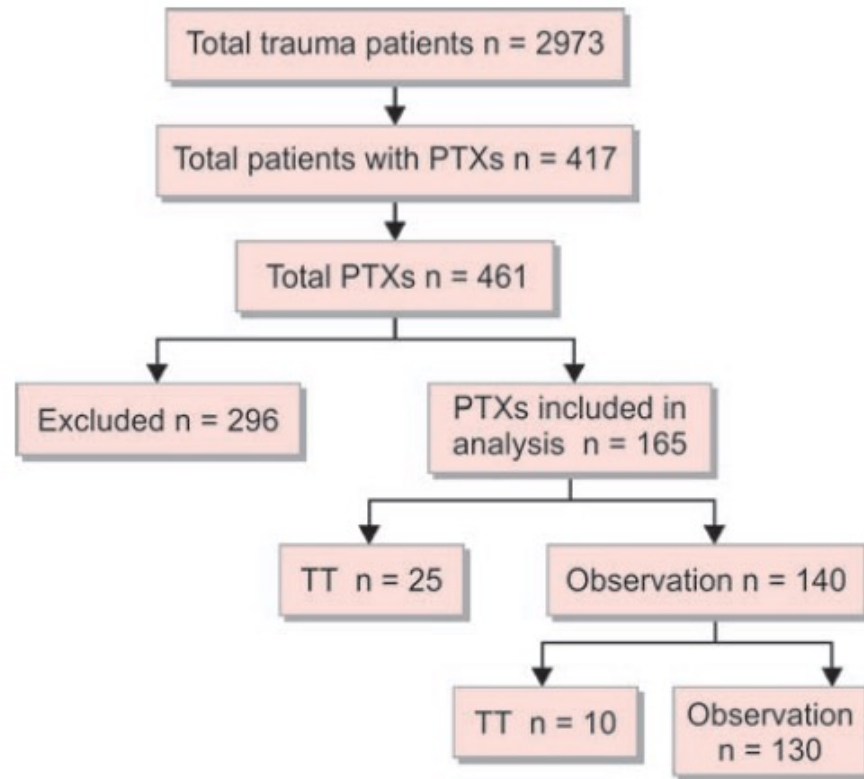
¹Catrina Cropano, ²Tomaz Mesar, ³David Turay, ⁴David King, ⁵Daniel Yeh, ⁶Peter Fagenholz
⁷George Velmahos, ⁸Marc A de Moya

- a retrospective medical record review, admitted to a level 1 trauma center
- 4 years period (Jan 2009 to Feb 2013)
- Inclusion: diagnosed with a traumatic pneumothorax and underwent chest CT imaging upon admission.
- Exclusion: who were moribund, younger than 16 years, did not undergo chest CT, had an ipsilateral hemothorax, received TT before undergoing a chest CT, or for those with an indeterminate reason for TT after initial observational management.
- The PTX measurement in centimeters spanned the perpendicular distance of the largest air pocket between the chest wall and the mediastinal or pulmonary structure.
- The primary outcome was success of observation.
- Failure= required TT, physiological deterioration: RR>30 bpm, SpO2 <94%(RA), HR>110bpm,sBP<90mmHg

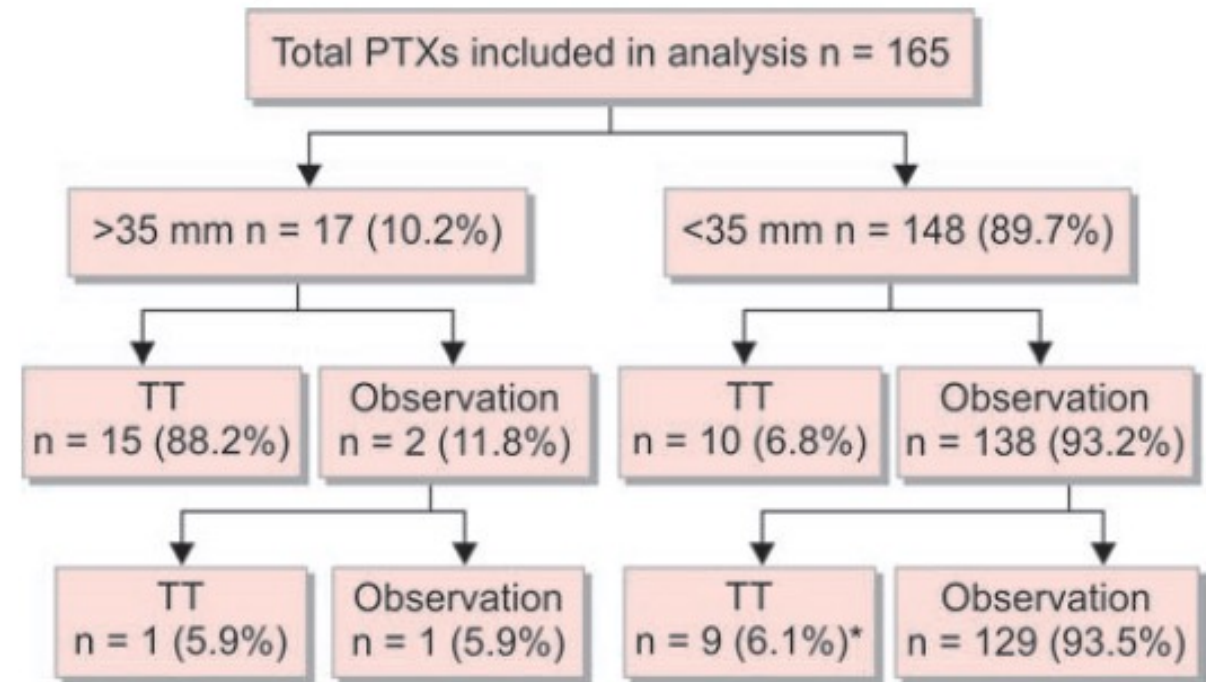
Pneumothoraces on Computed Tomography Scan: Observation using the 35 Millimeter Rule is Safe

¹Catrina Cropano, ²Tomaz Mesar, ³David Turay, ⁴David King, ⁵Daniel Yeh, ⁶Peter Fagenholz
⁷George Velmahos, ⁸Marc A de Moya

Flow Chart 1: Consort diagram



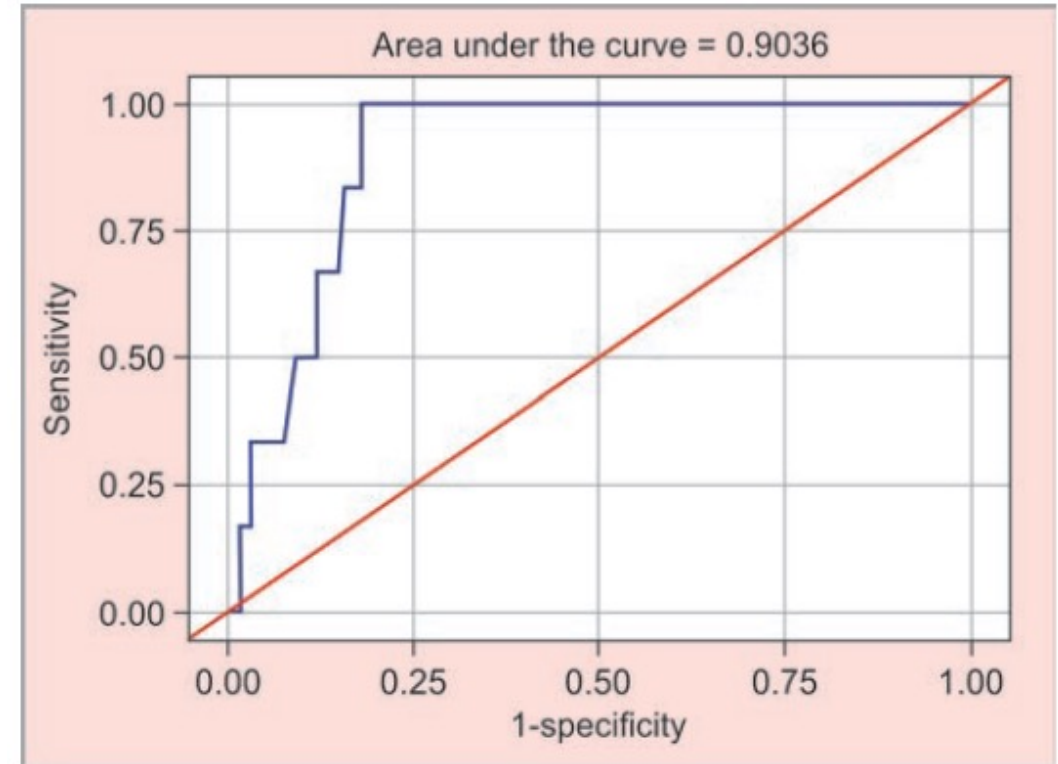
Flow Chart 2: *Six of the 9 in the ≤ 35 mm group who were observed and then received TT were failures. This gives a failure rate of 6/138, or 4.3%



Pneumothoraces on Computed Tomography Scan: Observation using the 35 Millimeter Rule is Safe

¹Catrina Cropano, ²Tomaz Mesar, ³David Turay, ⁴David King, ⁵Daniel Yeh, ⁶Peter Fagenholz
⁷George Velmahos, ⁸Marc A de Moya

- A cutoff measurement of 35mm
- NPV=95.7%, PPV=100%, ROC=0.90
- Sensitivity 100%, Specificity 98.5%
- Median time until TT removal; 2.5days



Graph 1: Receiver operating characteristic curve to predict successful observation when PTX measures ≤ 35 mm

Observing pneumothoraces: The 35-millimeter rule is safe for both blunt and penetrating chest trauma

Savo Bou Zein Eddine, MD, Kelly A. Boyle, MD, Christopher M. Dodgion, MD, MSPH, MBA, Christopher S. Davis, MD, MPH, Travis P. Webb, MD, MHPE, Jeremy S. Juern, MD, David J. Milia, MD, Thomas W. Carver, MD, Marshall A. Beckman, MD, Panna A. Codner, MD, Colleen Trevino, PhD, and Marc A. de Moya, MD, Milwaukee, Wisconsin

- Whether 35mm rule is valid for observation management in both blunt and penetrating trauma?
- A single-center retrospective chart review, admitted to a Level 1 trauma center
- 5 years (Jan 2011 to Dec 2016)
- Inclusion: 18 years and older who had a chest CT at the time of admission
- Exclusion: no CT, an ipsilateral hemothorax or hemopneumothorax, a TT inserted before CT, mechanically ventilated.
- The primary outcome was the successful observation(no intervention within 4 hours).
- Failure: a need for delayed TT, secondary interventions (VATS, tPA, thoracotomy), physiological deterioration
- The PTX measurement, the definition of physiological deterioration is same.

Observing pneumothoraces: The 35-millimeter rule is safe for both blunt and penetrating chest trauma

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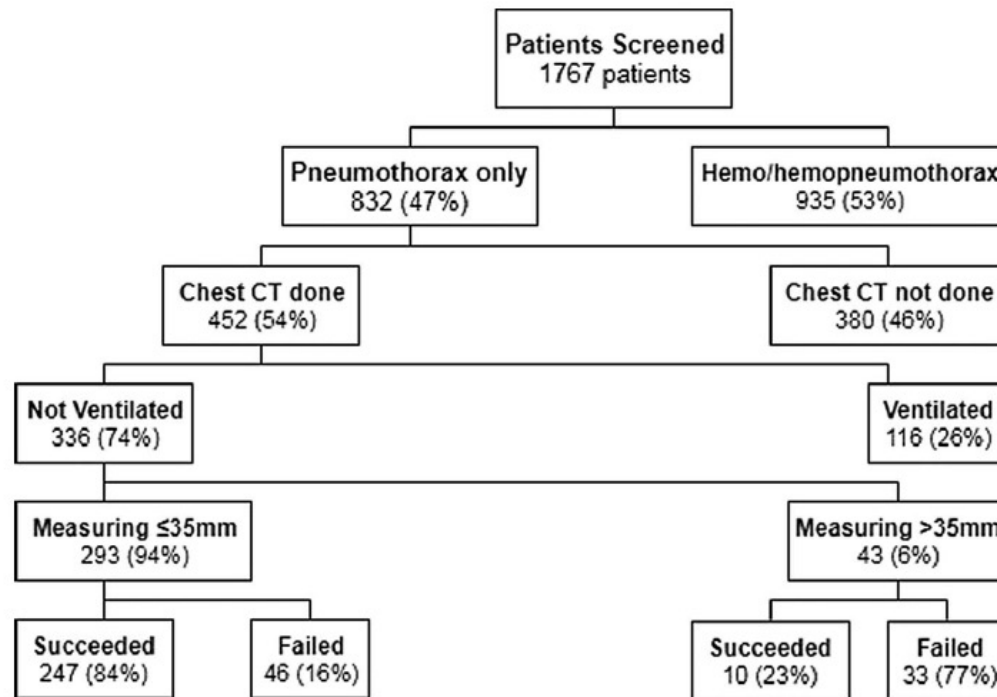


Figure 3. Flow diagram of included patients (all comers).

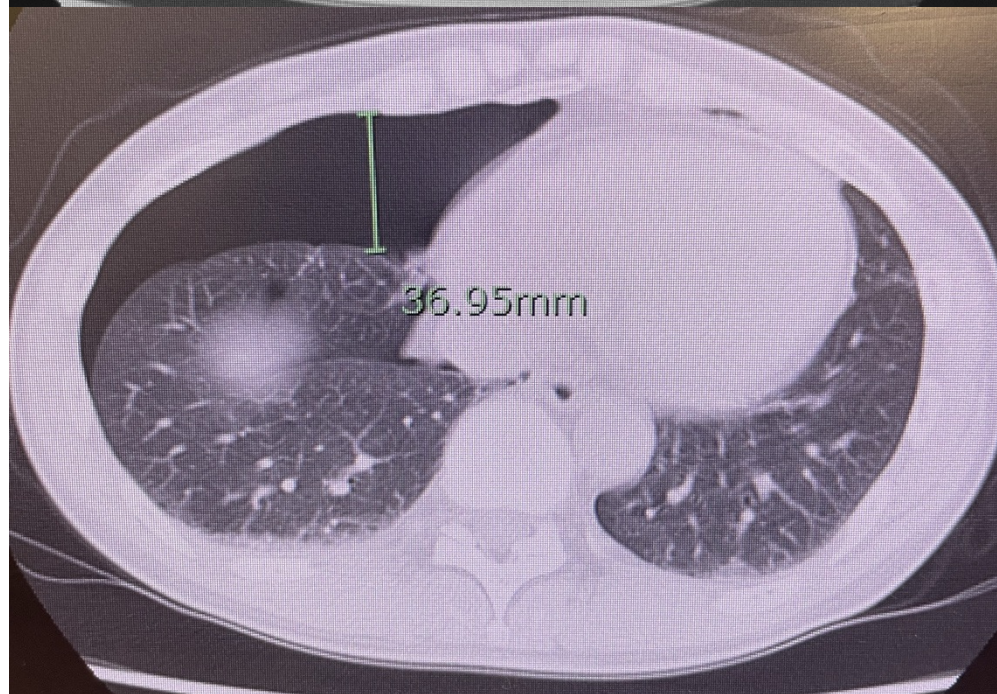
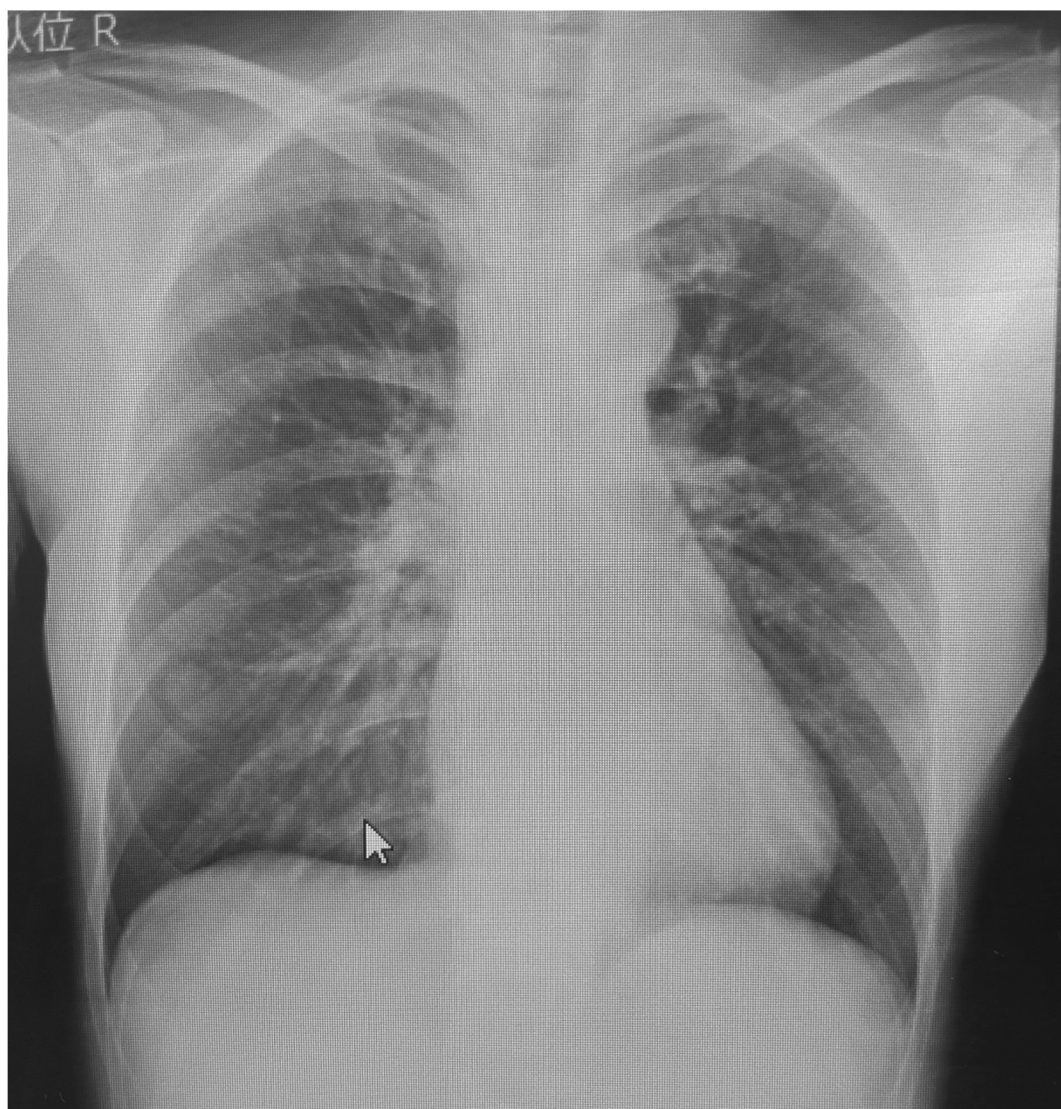
PPV= 90.8%, NPV= 41.2%

TABLE 3. Multivariate Logistic Regression With Failure of Observation as an Outcome, N = 289

Variable	<i>p</i>	OR [95% CI]
PTX measurement (≤ 35 mm as reference)	0.001	0.142 (0.047–0.428]
GCS	0.065	6.632 (0.889–49.483)
No. rib fractures	0.098	1.300 (0.953–1.774)



35mm ruleだな



抗生剤いる？

Use of prophylactic antibiotic in preventing complications for blunt and penetrating chest trauma requiring chest drain insertion: a systematic review and meta-analysis

Firas Ayoub, Michael Quirke, Daniel Frith

Table 1 Characteristics of studies included in the meta-analysis of antibiotic vs placebo after chest drain insertion

Reference	Year	Country	Sample size	Injury type	Antibiotic	Duration
Grover ¹³	1977	USA	75	Penetrating	Clindamycin 300 mg six hourly	>24 hours
Stone ⁶	1981	USA	83	Penetrating, blunt	Cefamandole 1 g six hourly	>24 hours
LeBlanc ⁵	1985	USA	52	Penetrating, blunt	Cefadyl 1 g	>24 hours
Mandal ¹⁴	1985	USA	80	Penetrating	Doxycycline 100 mg 12 hourly	>24 hours
LoCurto ¹⁵	1986	USA	58	Penetrating, blunt	Cefoxitin 1 g six hourly	>24 hours
Brunner ²⁰	1990	USA	90	Penetrating, blunt	Cefazolin six hourly	>24 hours
Cant ¹⁶	1993	South Africa	113	Penetrating	Cefazolin 500 mg eight hourly	24 hours
Nichols ¹⁹	1994	USA	119	Penetrating, blunt	Cefonicid 1 g per day	>24 hours
Gonzalez ¹⁷	1998	USA	139	Penetrating, blunt	Cefazolin 1 g eight hourly	>24 hours
Maxwell ⁷	2004	USA	224	Penetrating, blunt	Cefazolin 1 g eight hourly	≥24 hours
Villegas Carlos ¹⁸	2009	Mexico	126	Penetrating, blunt	Cefazolin 1 g eight hourly	>24 hours
Heydari ¹²	2014	Iran	104	Blunt	Cefazolin 2 g	24 hours

Use of prophylactic antibiotic in preventing complications for blunt and penetrating chest trauma requiring chest drain insertion: a systematic review and meta-analysis

Firas Ayoub, Michael Quirke, Daniel Frith

Table 2 Primary outcomes

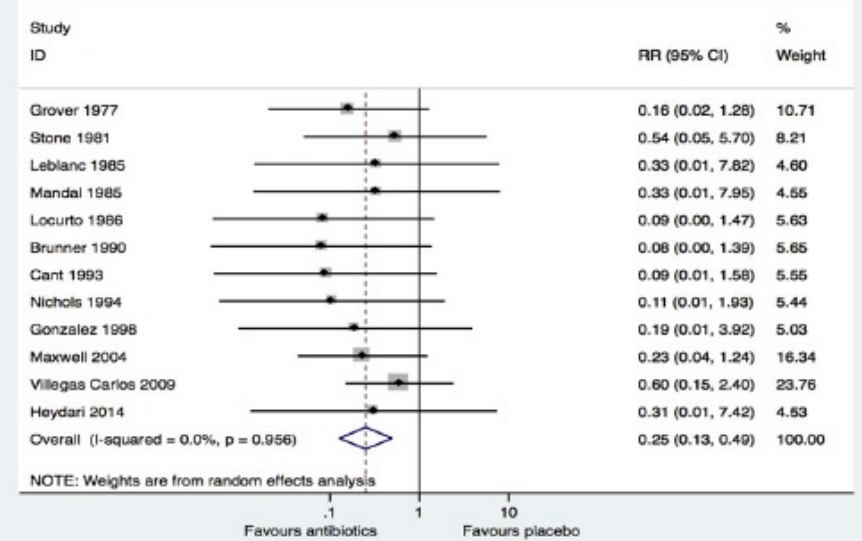
Study ID	Antibiotic group			Placebo group		
	Total	Empyema	Pneumonia	Total	Empyema	Pneumonia
Grover ¹³	38	1	4	37	6	13
Stone ⁶	40	1	0	43	2	5
LeBlanc ⁵	26	0	1	26	1	1
Mandal ¹⁴	40	0	0	40	1	0
LoCurto ¹⁵	30	0	0	28	5	4
Brunner ²⁰	44	0	1	46	6	3
Cant ¹⁶	57	0	7	56	5	19
Nichols ¹⁹	63	0	0	56	4	3
Gonzalez ¹⁷	71	0	0	68	2	2
Maxwell ⁷	153	2	12	71	4	2
Villegas Carlos ¹⁸	63	3	N/A	63	5	N/A
Heydari ¹²	54	0	2	50	1	4
Total	679	7 (1%)	27 (4.4%)	584	42 (7.2%)	56 (10.7%)

Values in parenthesis are percentages.

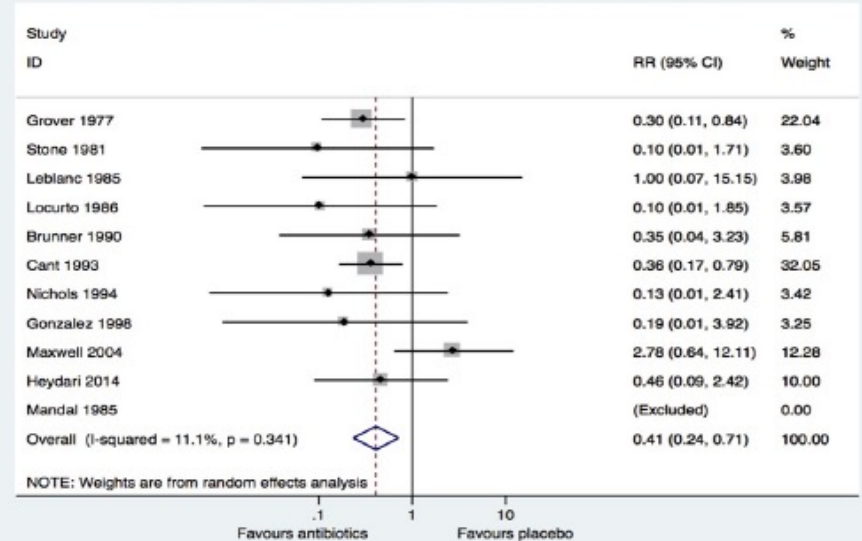


抗生剤は要りなんすね。

Empyema after chest drain insertion



Pneumonia after chest drain insertion



Randomized clinical trial of pigtail catheter *versus* chest tube in injured patients with uncomplicated traumatic pneumothorax

N. Kulvatunyou, L. Erickson, A. Vijayasekaran, L. Gries, B. Joseph, R. F. Friese, T. O'Keeffe, A. L. Tang, J. L. Wynne and P. Rhee

Division of Acute Care Surgery, Department of Surgery, University of Arizona, 1501 North Campbell Avenue, Room 5411, PO Box 245063, Tucson, Arizona 85724-5063, USA

Correspondence to: Dr N. Kulvatunyou (e-mail: nkulvatunyou@surgery.arizona.edu)

ドレーンの太さは？

P: 18歳以上の緊急を要さない外傷性気胸患者

I: 14 Fr pigtail catheter

C: 28 Fr chest tube

O: pain at the tube site and the daily intravenous pain medication usage

Exclusion: patient refusal, could not respond to pain, hemothorax, emergency tube insertion

Randomized clinical trial of pigtail catheter *versus* chest tube in injured patients with uncomplicated traumatic pneumothorax

N. Kulvatunyou, L. Erickson, A. Vijayasekaran, L. Gries, B. Joseph, R. F. Friese, T. O’Keeffe, A. L. Tang, J. L. Wynne and P. Rhee

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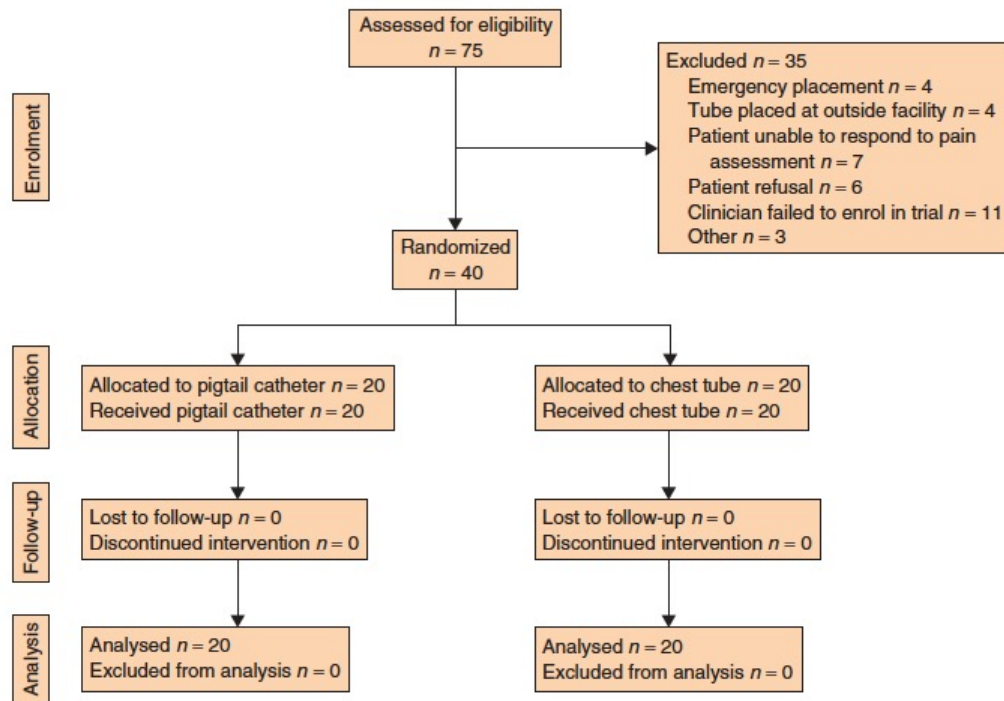


Fig. 2 CONSORT diagram for the trial

	Pigtail catheter (n = 20)	Chest tube (n = 20)	P [‡]
Age (years)*	46(4)	46(4)	0.992§
Sex ratio (M:F)	17:3	16:4	0.683
No. with blunt trauma	17 (85)	16 (80)	0.683
ISS*	14.5(1.1)	12.2(1.2)	0.163§
Chest AIS†	3 (2–4)	3 (1–4)	0.285¶
No. of rib fractures†	1.5 (0–5)	1.5 (0–5)	0.912¶
Pulmonary contusion	5 (25)	5 (25)	1.000
Flail segment	0 (0)	0 (0)	–

Randomized clinical trial of pigtail catheter *versus* chest tube in injured patients with uncomplicated traumatic pneumothorax

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Table 2 Comparison of outcomes between groups

	Pigtail catheter (n = 20)	Chest tube (n = 20)	P¶
NRS score for chest wall pain*			
Day 0	6.1(0.6)	6.0(0.8)	0.917
Day 1	5.5(0.5)	5.9(0.7)	0.652
Day 2‡	4.2(1.1)	5.9(1.0)	0.274
Total pain medication usage (units)*§			
Day 1	10.3(2.4)	15.4(3.4)	0.227
Day 2	5.0(2.6)	8.6(2.5)	0.323
Success rate	19 (95)	18 (90)	0.554#
Insertion-related complication	2 (10)	2 (10)	1.000#
Duration of tube insertion (days)†	2 (2–3)	2 (2–6)	0.172**
Duration of hospital stay (days)†	4 (3–7)	4 (3–7)	0.863**



安定していれば細い方がいいな。

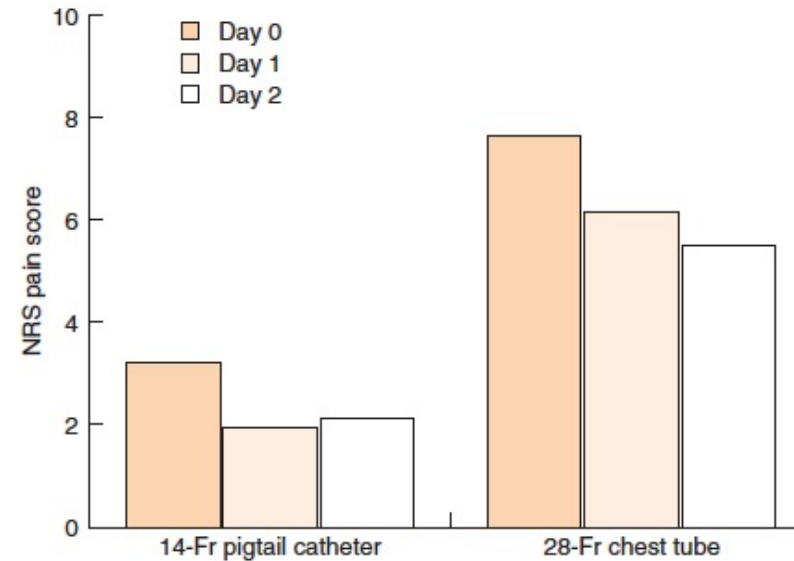


Fig. 3 Mean numerical rating scale (NRS) tube-site pain score, by day after insertion, in patients with traumatic pneumothorax treated with a 14-Fr pigtail catheter or 28-Fr chest tube. $P < 0.001$ on days 0 and 1, $P = 0.040$ on day 2 (Student’s *t* test)

better pain scores in those with pigtail catheters. Therefore, the smallest caliber chest tube on-hand should be used; however, it is recommended that a thick-walled tube is used rather than a small-caliber thin-walled argyle tube. This limits the degree of kinking and twisting associated with smaller diameter tubes. However, because of the emphasis in the randomized trial on uncomplicated traumatic pneumothoraces, if there is a significant component of hemothorax, one may consider a larger (28Fr) chest tube. Many institutions are now using pigtails for hemothoraces as well, and this is discussed in the WTA hemothorax algorithm.



Randomized Clinical Trial of 14-French (14F) Pigtail Catheters versus 28–32F Chest Tubes in the Management of Patients with Traumatic Hemothorax and Hemopneumothorax

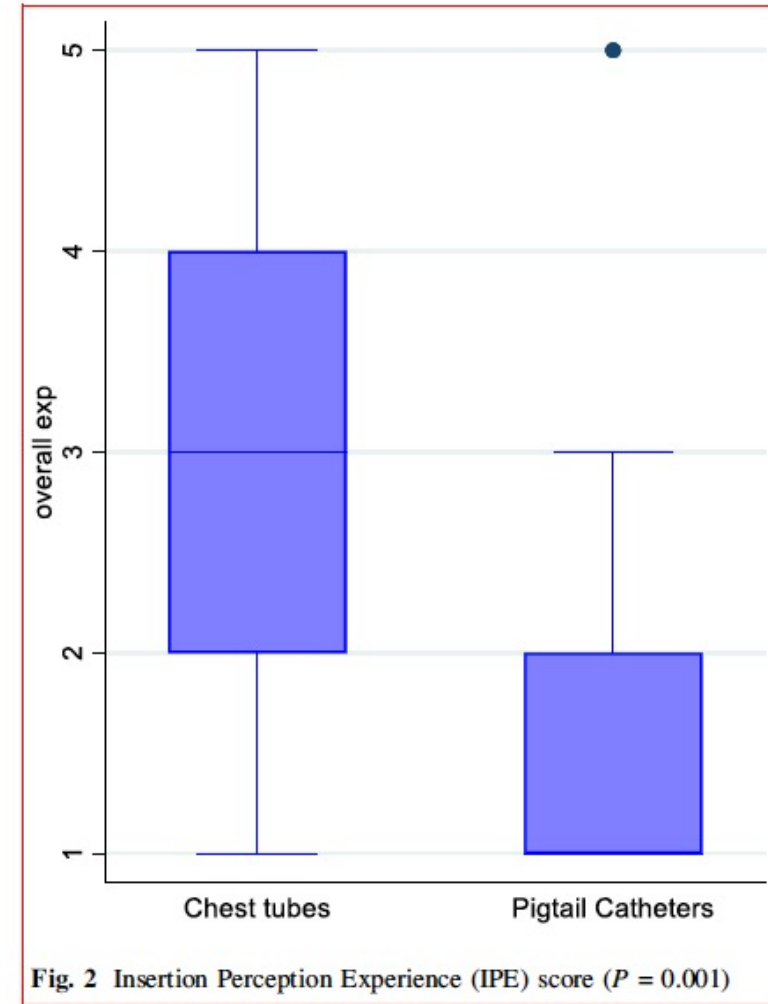
Zachary M. Bauman¹ · Narong Kulvatunyou² · Bellal Joseph² · Lynn Gries² · Terence O’Keeffe² · Andrew L. Tang² · Peter Rhee³

World J Surg

Table 2 Comparison of outcomes

	Pigtail catheters (N = 20)	Chest tubes (N = 23)	P
Failure rate, %, (n)	10 (2)	17 (4)	0.49
Initial output (ml), median (IQR)	650 (375, 1087)	400 (240, 700)	0.06
24 h output	980 (600, 1625)	660 (430, 1000)	0.10
48 h output	300 (110, 424)	225 (90, 400)	0.22
72 h output	50 (0, 200)	130 (0, 260)	0.54
Tube days, median, (days)	4 (3, 5.5)	4 (2, 7)	0.79
IPE score, median (IQR)	1 (1, 2)	3 (3, 4)	0.001
VATS, %	5	9	0.64
Ventilator day, median (IQR)	0 (0, 0.5)	0 (0, 0)	0.30
ICU day, median (IQR)	0 (0, 3.5)	0 (0, 3)	0.86
Hospital length of stay, median, (days)	6.5 (4.5, 10)	7 (3, 9)	0.54

ICU intensive care unit, IPE insertion perception score, IQR interquartile range, ml millimetres, SD standard deviation, VATS video-assisted thoracoscopy



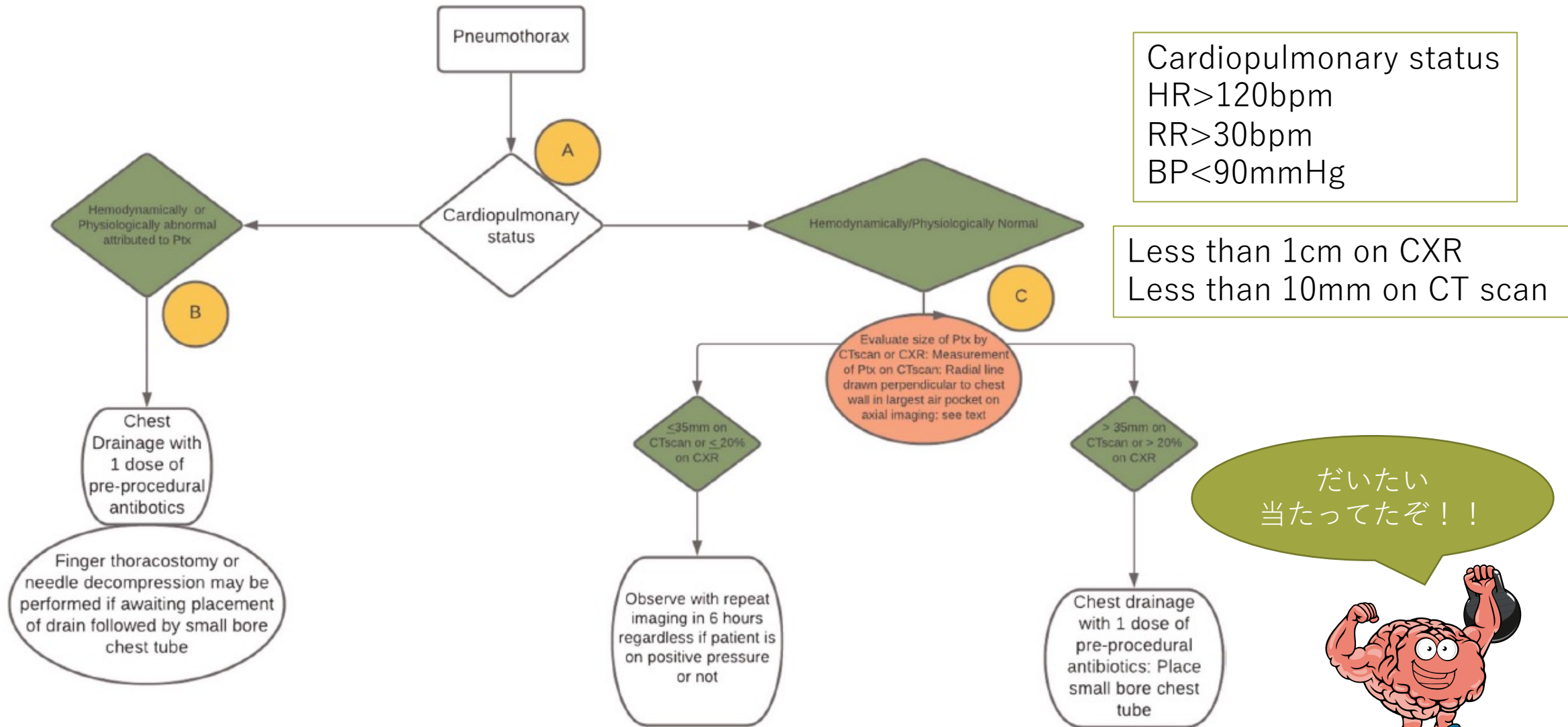


Figure 1. WTA algorithm for management of a traumatic PTX.

私見

- Evidence levelがあまり高くないけど、判断材料としては使いやすいかなと
- 当院は12Frアスピレーションキット、20,28,32Frの胸腔ドレーンを常備
- 20Frはもう少し細くてもいいかもなど。
- 32Frはもういらない？
- VATSの適応拡大によりドレーンだけで治療することが少なくなったのかなと

