



# Thromboaspiration : le cadavre bouge encore !!

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# DÉCLARATION DE LIENS D'INTÉRÊT AVEC LA PRÉSENTATION

**Intervenant : NACER BEY Mustapha, Alger**

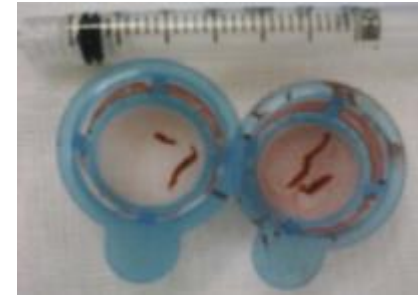
Je n'ai pas de lien d'intérêt à déclarer

La thromboaspiration technique simple mais controversée,

Indication limitée aux STEMI

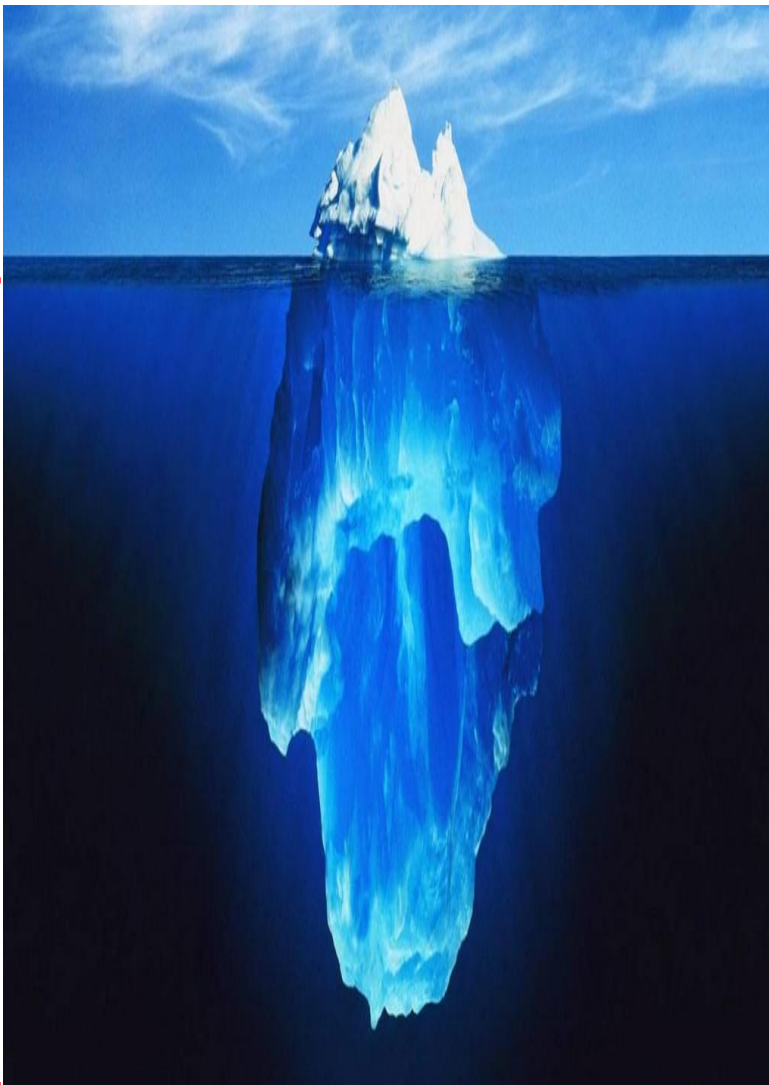
Sa place reste toujours discutable

**Fait l'objet de polémique**



- Consiste a aspirer manuellement le thrombus
- But est d'améliorer le flux coronaire
- Embolisation distale blush myocardique(TAPAS)
- Non dénuée de risque

Epicardial



TIMI score

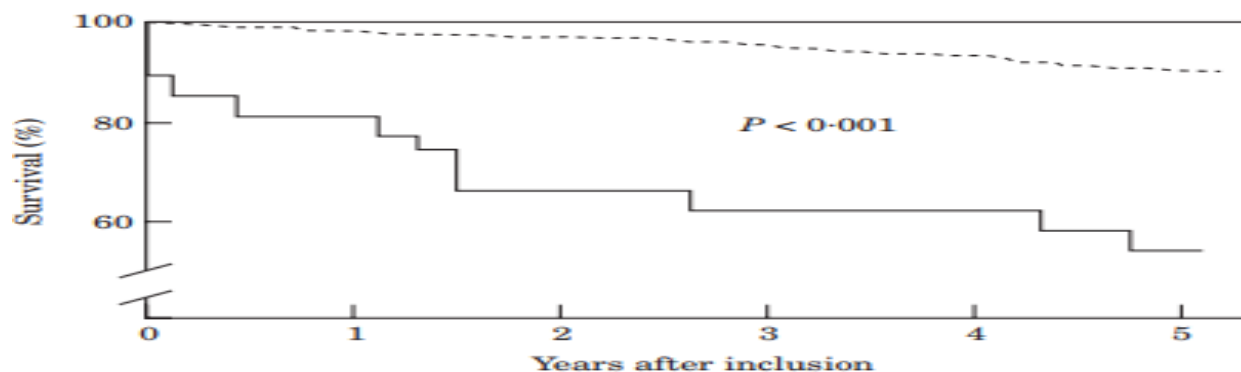
Myocardial



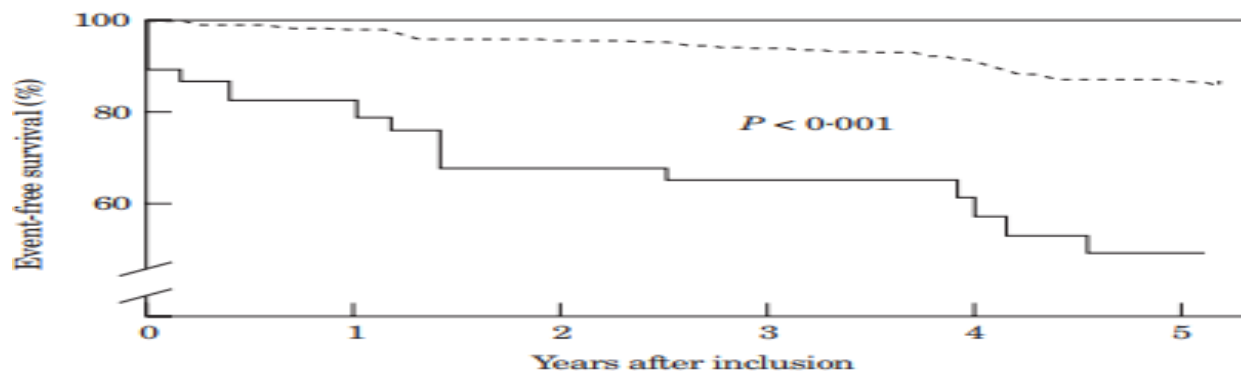
Blush score  
ST segment  
resolution

## Incidence and clinical significance of distal embolization during primary angioplasty for acute myocardial infarction

J. P. S. Henriques, F. Zijlstra, J. P. Ottervanger, M.-J. de Boer, A. W. J. van 't Hof, J. C. A. Hoorntje and H. Suryapranata



**Figure 2** Long-term survival in patients with (—) or without (---) distal embolization ( $P < 0.001$ ).



**Figure 3** Long-term survival without re-infarction in patients with (—) or without (---) distal embolization ( $P < 0.001$ ).

# La thromboaspiration dans le temps

TAPAS

2008



Thrombus Aspiration during Percutaneous coronary intervention in Acute myocardial infarction Study (TAPAS)

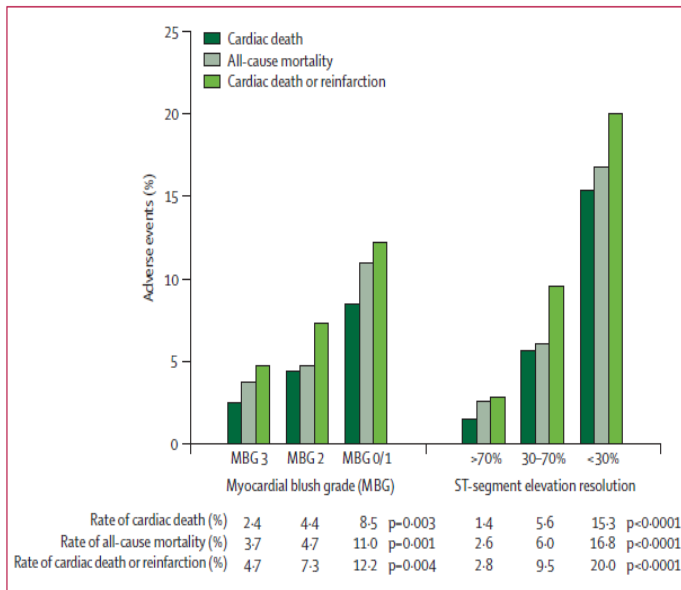
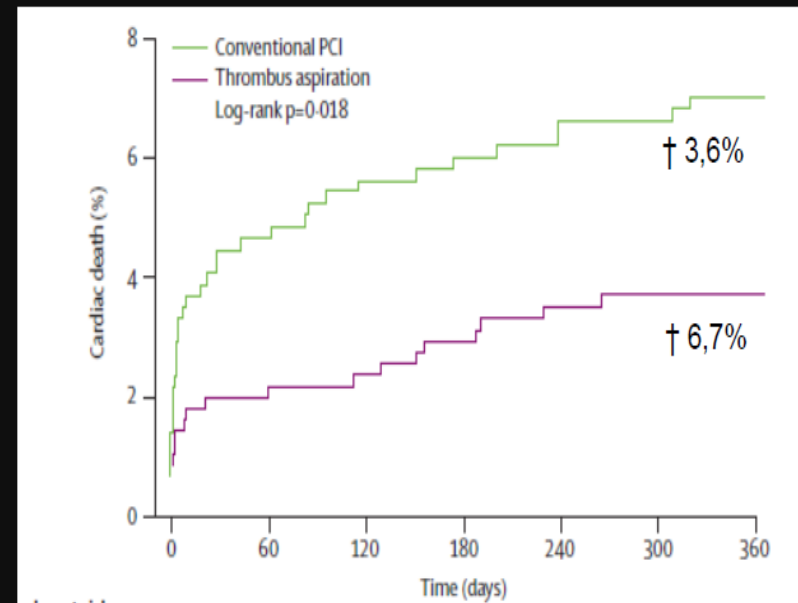


Figure 1: Relation between parameters for myocardial reperfusion and total mortality, cardiac death, and the combined endpoint of cardiac death or non-fatal reinfarction at 1-year follow-up

# TAPAS

PJ Vlach Lancet 2008; 371: 1915-20

Monocentrique 1071 pts randomisée





# La thromboaspiration dans le temps



Recommendations	Class <sup>a</sup>	Level <sup>b</sup>	Ref <sup>c</sup>
<b>Indications for primary PCI</b>			
Primary PCI is the recommended reperfusion therapy over fibrinolysis if performed by an experienced team within 120 min of FMC.	I	A	69,99
Primary PCI is indicated for patients with severe acute heart failure or cardiogenic shock, unless the expected PCI related delay is excessive and the patient presents early after symptom onset.	I	B	100
<b>Procedural aspects of primary PCI</b>			
Stenting is recommended (over balloon angioplasty alone) for primary PCI.	I	A	101, 102
Primary PCI should be limited to the culprit vessel with the exception of cardiogenic shock and persistent ischaemia after PCI of the supposed culprit lesion.	IIa	B	75, 103–105
If performed by an experienced radial operator, radial access should be preferred over femoral access.	IIa	B	78, 79
If the patient has no contraindications to prolonged DAPT (indication for oral anticoagulation, or estimated high long-term bleeding risk) and is likely to be compliant, DES should be preferred over BMS.	IIa	A	80, 82, 106, 107
Routine thrombus aspiration should be considered.	IIa	B	83–85
Routine use of distal protection devices is not recommended.	III	C	86, 108
Routine use of IABP (in patients without shock) is not recommended.	III	A	97, 98



# La thromboaspiration dans le temps

TAPAS  
2008



TASTE  
2013/2104



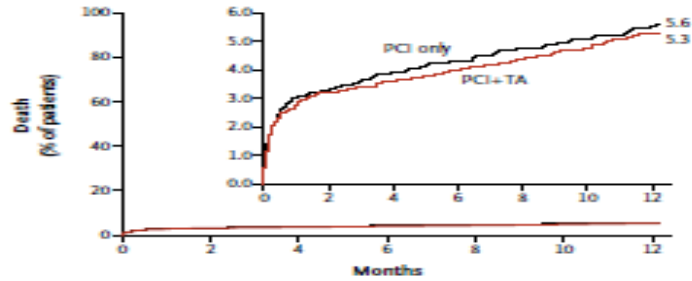
Thrombus Aspiration during Percutaneous coronary intervention in Acute myocardial infarction Study (TAPAS)

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Outcomes 1 Year after Thrombus Aspiration for Myocardial Infarction

**A Cumulative Risk of Death**



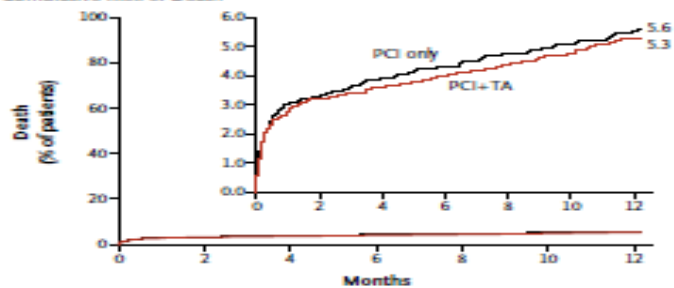
**No. at Risk**

PCI+TA	3621	3500	3485	3470	3456	3440	3425
PCI only	3623	3503	3481	3466	3450	3435	3420

**B Cumulative Risk of Rehospitalization for Infarction**

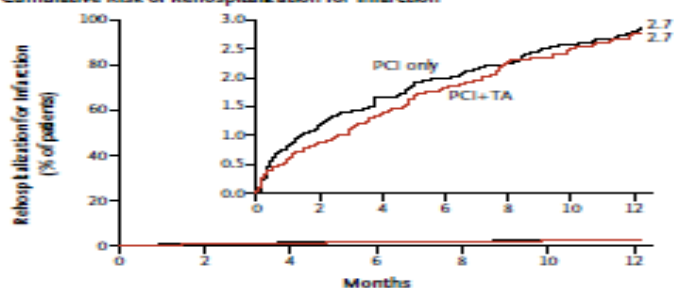


**A Cumulative Risk of Death**



No. at Risk	0	2	4	6	8	10	12
PCI+TA	3621	3500	3485	3470	3456	3440	3425
PCI only	3623	3503	3481	3466	3450	3435	3420

**B Cumulative Risk of Rehospitalization for Infarction**

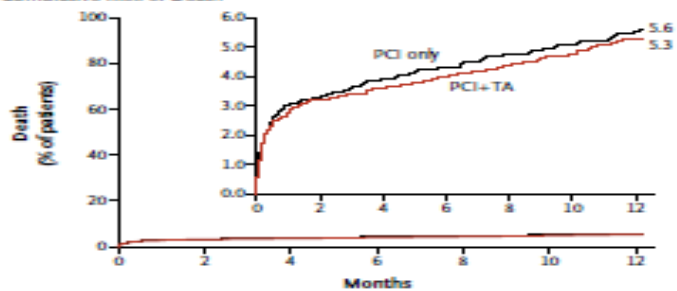


No. at Risk	0	2	4	6	8	10	12
PCI+TA	3621	3473	3441	3412	3384	3360	3336
PCI only	3623	3463	3424	3398	3374	3349	3327

**C Cumulative Risk of Stent Thrombosis**

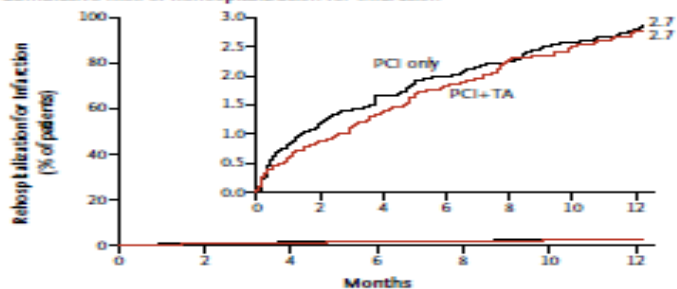
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**A Cumulative Risk of Death**



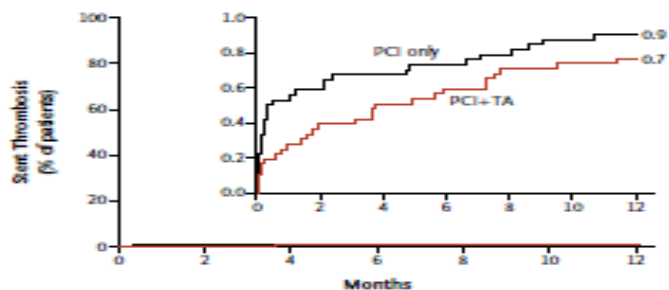
No. at Risk	
PCI+TA	3621 3500 3485 3470 3456 3440 3425
PCI only	3623 3503 3481 3466 3450 3435 3420

**B Cumulative Risk of Rehospitalization for Infarction**

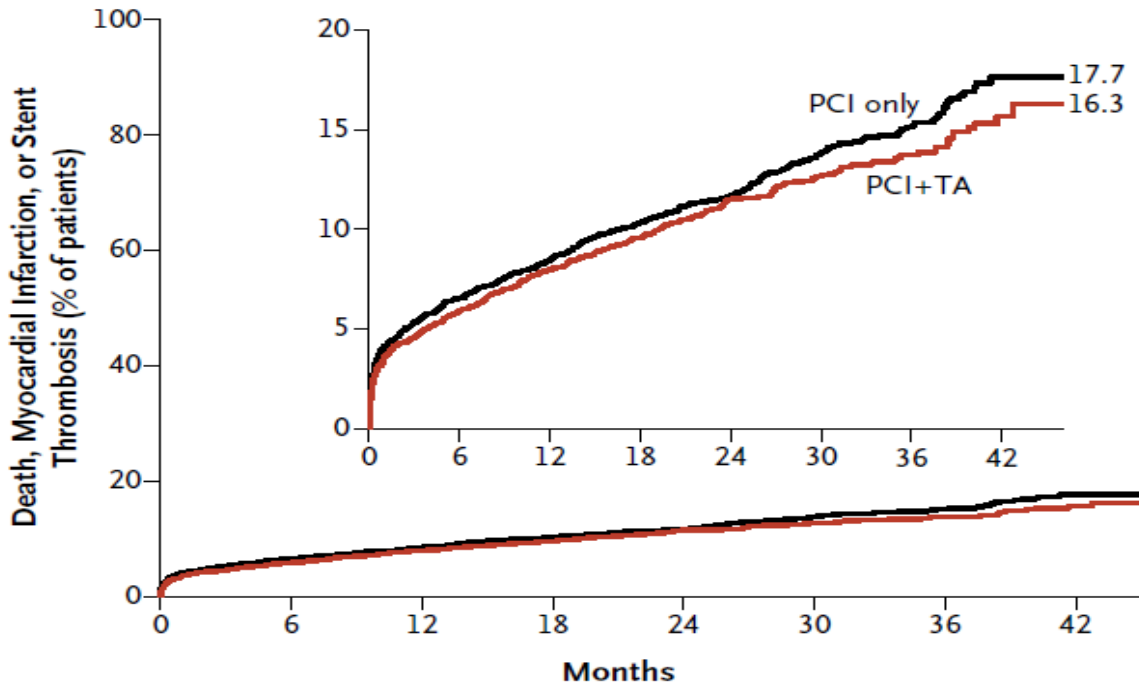
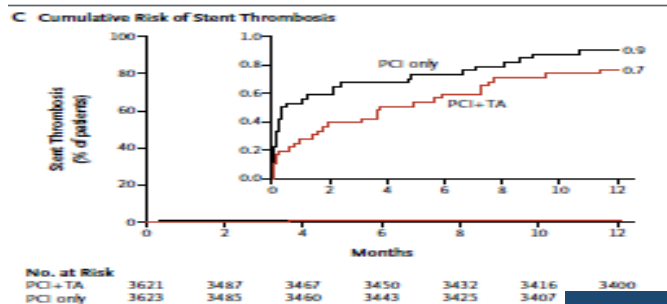
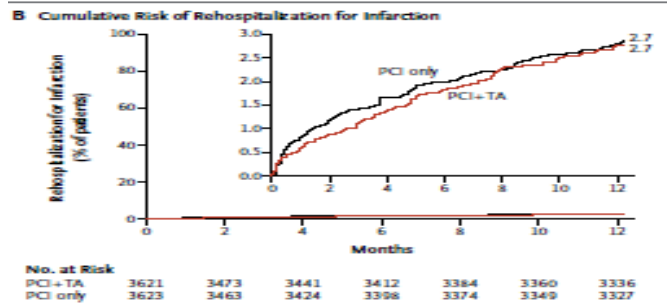
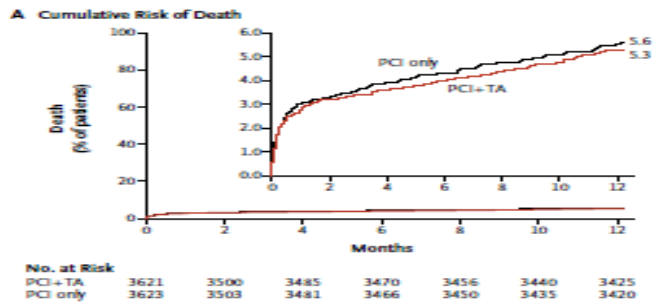


No. at Risk	
PCI+TA	3621 3473 3441 3412 3384 3360 3336
PCI only	3623 3463 3424 3398 3374 3349 3327

**C Cumulative Risk of Stent Thrombosis**



No. at Risk	
PCI+TA	3621 3487 3467 3450 3432 3416 3400
PCI only	3623 3485 3460 3443 3425 3407 3392



**Figure 2. Time-to-Event Curves for the Total Duration of Follow-up after the Intervention.**

TASTE	DC 30 J	thrombose	IDM	AVC
Thrombectomie	2,8 %	0,2 %	0,5 %	0,5 %
∅ thrombectomie	3 %	0,5 %	0,9 %	0,5 %
P	0.63	0,06	0,09	0,87

## 2014 ESC/EACTS Guidelines on myocardial revascularization

Thrombus aspiration may be considered in selected patients.

**IIb**

**A**



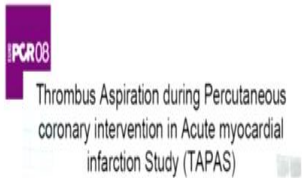
# La thromboaspiration dans le temps

RESCUE TAPAS  
2004 2008

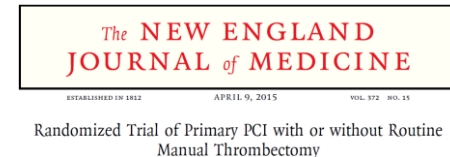
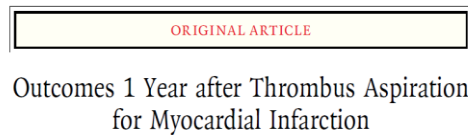


TASTE  
2013/2014

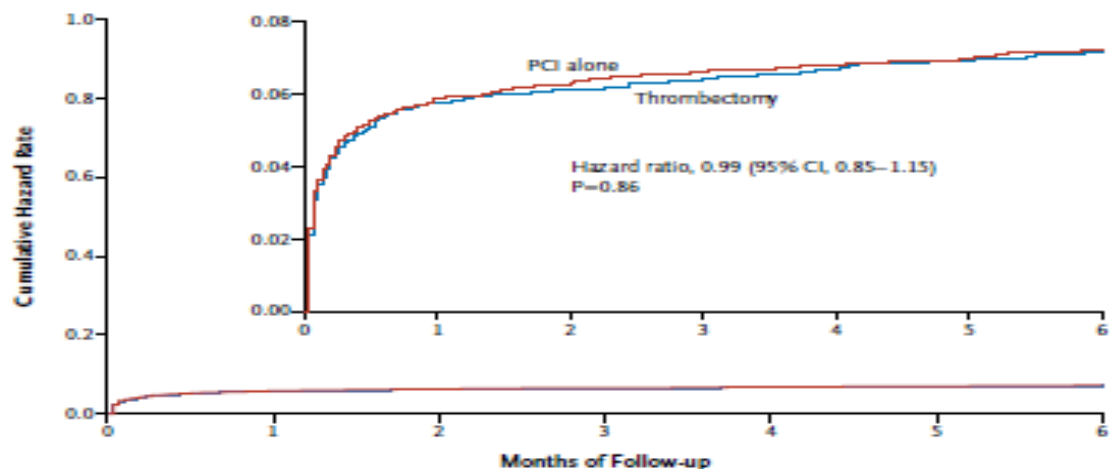
TOTAL  
2015



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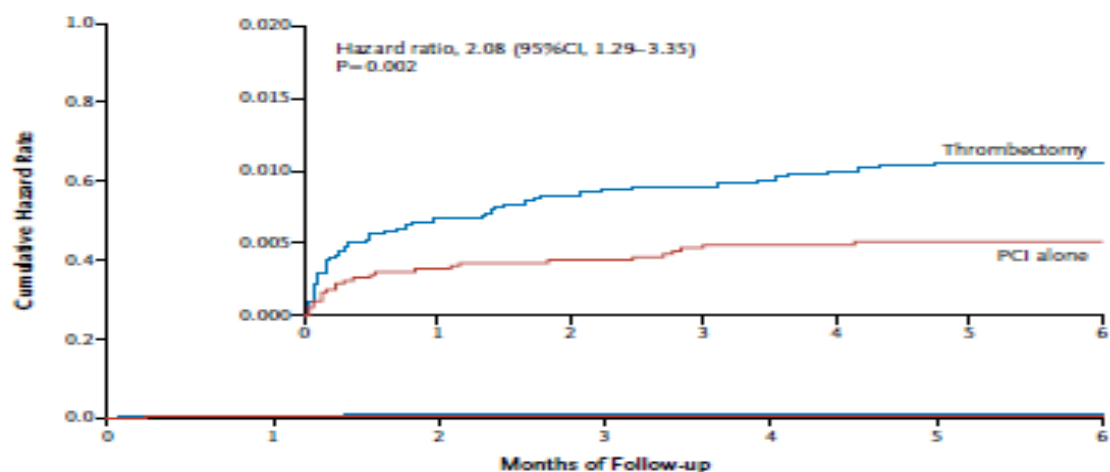


### A Primary Outcome



No. at Risk	0	1	2	3	4	5	6
Thrombectomy	5033	4734	4696	4678	4662	4647	4628
PCI alone	5030	4727	4688	4666	4653	4642	4618

### B Stroke



No. at Risk	0	1	2	3	4	5	6
Thrombectomy	5033	4873	4836	4819	4806	4794	4778
PCI alone	5030	4866	4829	4810	4800	4791	4775

**Figure 1. Kaplan–Meier Estimates for the Primary Outcome and Stroke at 180 Days.**

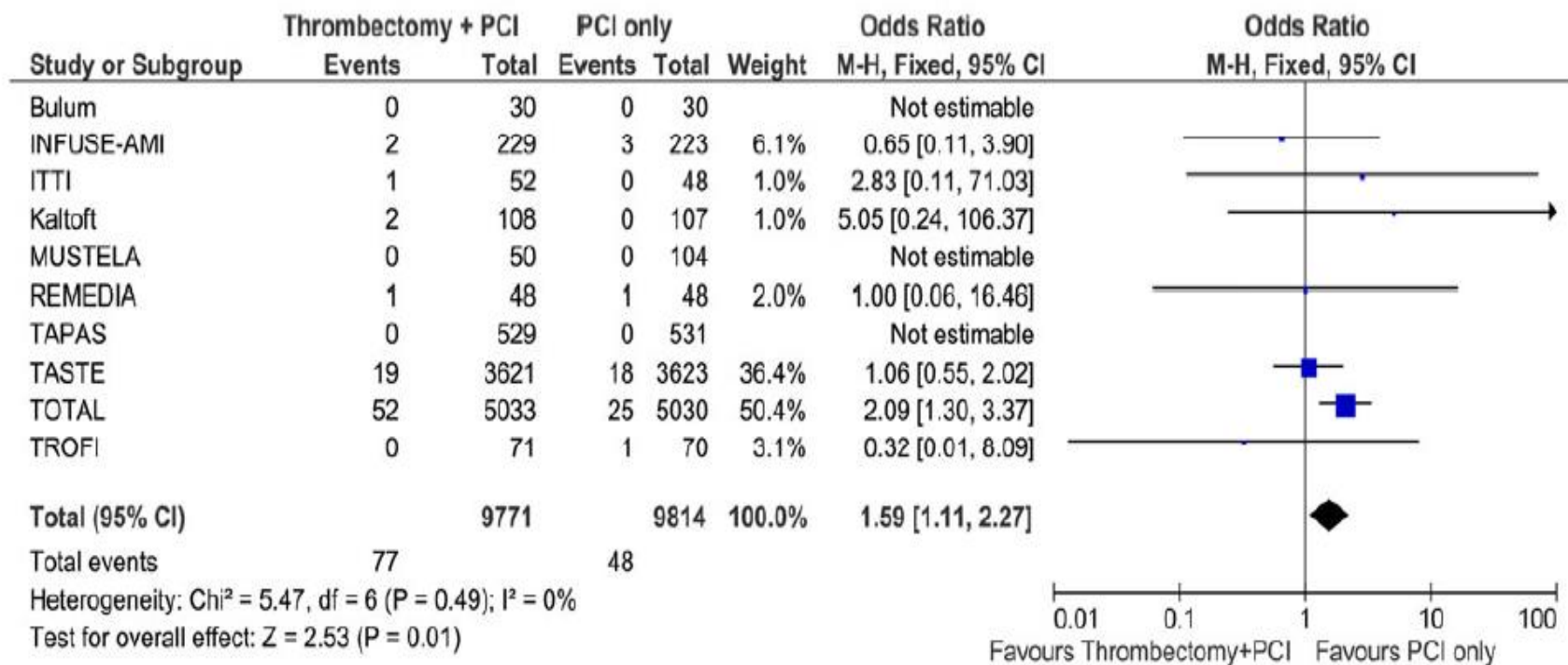
Shown are the cumulative hazard rates of the primary outcome (death from cardiovascular causes, recurrent myocardial infarction, cardiogenic shock, or New York Heart Association class IV heart failure) (Panel A) and stroke (Panel B) in the thrombectomy group and the percutaneous coronary intervention (PCI)–alone group within 180 days after the procedure. In each panel, the inset shows a more detailed view of the same data up to a probability of 0.08 in Panel A and 0.020 in Panel B.

## Safety Outcomes at 1 year

	Thrombectomy (N=5033) (%)	PCI alone (N=5030) (%)	HR	95% CI	p
Stroke at 1 year	60 (1.2)	36 (0.7)	1.66	(1.10 – 2.51)	0.015
Stroke or TIA at 1 year	73 (1.4)	44 (0.9)	1.65	(1.14 – 2.40)	0.008
Landmark Analyses					
Late stroke 180 days to 1 year	7 (0.1)	10 (0.2)	0.70	(0.27 – 1.83)	0.46



## Stroke in the TOTAL trial: a randomized trial of routine thrombectomy vs. percutaneous coronary intervention alone in ST elevation myocardial infarction



Meta-analysis for stroke outcome. Ten of 20 thrombectomy trials published outcomes for stroke.

2015 ACC/AHA/SCAI Focused Update on Primary Percutaneous Coronary Intervention for Patients With ST-Elevation Myocardial Infarction



An Update of the 2011 ACCF/AHA/SCAI Guideline for Percutaneous Coronary Intervention and the 2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction

2011/2013 Recommendation	2015 Focused Update Recommendations	Comments
<b>Class IIa</b> Manual aspiration thrombectomy is reasonable for patients undergoing primary PCI (29-32). (Level of Evidence: B)	<b>Class IIb</b> The usefulness of selective and bailout aspiration thrombectomy in patients undergoing primary PCI is not well established (33-37). (Level of Evidence: C-LD)	Modified recommendation (Class changed from "IIa" to "IIb" for selective and bailout aspiration thrombectomy before PCI).
	<b>Class III: No Benefit</b> <b>Routine aspiration thrombectomy before primary PCI is not useful (33-37).</b> (Level of Evidence: A)	New recommendation ("Class III: No Benefit" added for routine aspiration thrombectomy before PCI).

# 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation



EUROPEAN SOCIETY OF CARDIOLOGY®

Routine use of thrombus aspiration is not recommended.<sup>157,159</sup>

III

A

ESC Guidelines

ratio 1.56, 95% CI 1.02–2.42,  $P = 0.04$ ]. However, the interaction  $P$  values were 0.32 and 0.34, respectively.<sup>162</sup>

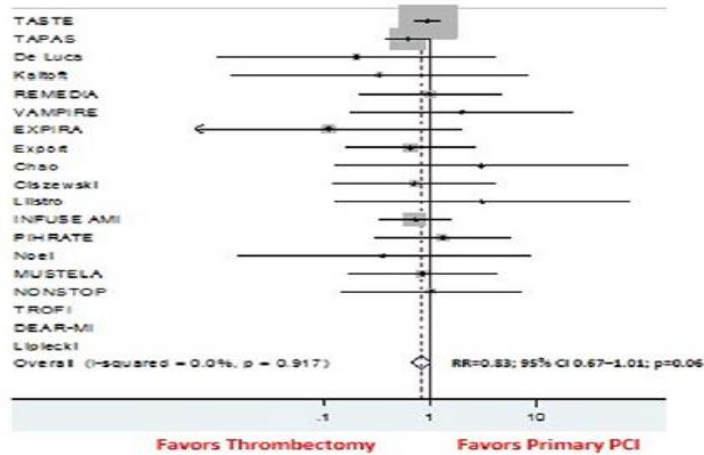
In the Taste<sup>157</sup> and TOTAL trials<sup>159</sup>, 1–5% of randomized patients crossed over from PCI alone to thrombus aspiration. Based on these data and the results of a recent meta-analysis,<sup>162</sup> routine thrombus aspiration is not recommended, but in cases of large residual thrombus burden after opening the vessel with a guide wire or a balloon, thrombus aspiration may be considered.

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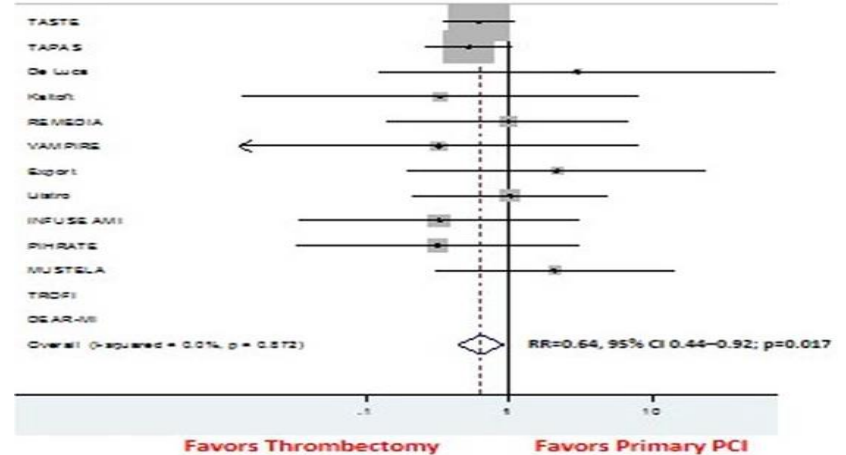
Que reste -t-il de la  
thromboaspiration?

# Aspiration Thrombectomy in Patients Undergoing Primary Angioplasty: Totality of Data to 2013

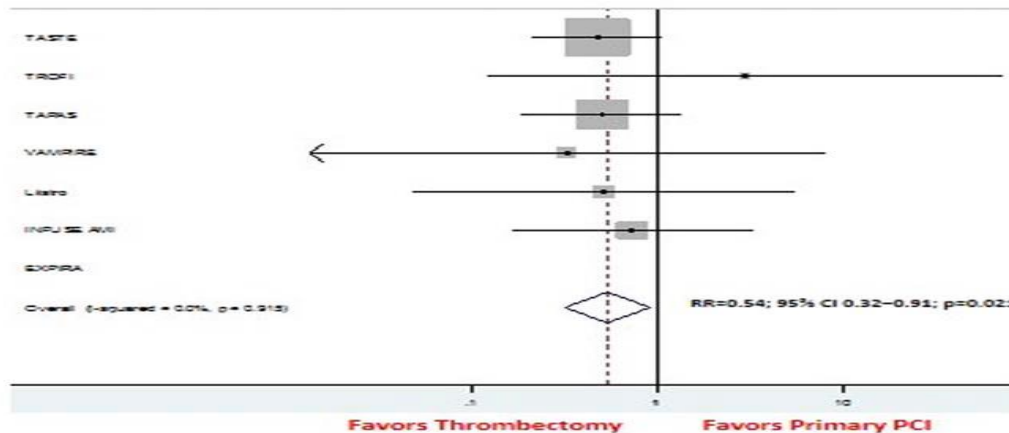
## Mortality



## Myocardial Infarction



## Stent Thrombosis





# Impact of Thrombus Aspiration on Mortality, Stent Thrombosis, and Stroke in Patients With ST-Segment–Elevation Myocardial Infarction: A Report From the Swedish Coronary Angiography and Angioplasty Registry

Oskar Angerås, MD, PhD; Inger Haraldsson, MD; Björn Redfors, MD, PhD; Ole Fröbert, MD, PhD; Petur Petursson, MD, PhD; Per Albertsson, MD, PhD; Dan Ioanes, MD; Jacob Odenstedt, MD, PhD; Hans Olsson, MD; Nils Witt, MD, PhD; Andreas Rück, MD, PhD; Jonas Millgård, MD, PhD; Johan Nilsson, MD, PhD; Jonas Persson, MD, PhD; Måns Söderbom, PhD; Hans Wedel, PhD; David Erlinge, MD, PhD; Stefan James, MD, PhD; Truls Råmunddal, MD, PhD; Elmir Omerovic, MD, PhD

**Background**—Thrombus aspiration is still being used in a substantial number of patients despite 2 large randomized clinical trials showing no favorable effect of routine thrombus aspiration during primary percutaneous coronary intervention in patients with ST-segment–elevation myocardial infarction. The aim of this observational study was to evaluate the impact of thrombus aspiration on mortality, stent thrombosis, and stroke using all available data from the Swedish Coronary Angiography and Angioplasty Registry (SCAAR).

**Methods and Results**—We identified 42 829 consecutive patients registered in SCAAR between January 2005 and September 2014 who underwent percutaneous coronary intervention for ST-segment–elevation myocardial infarction. Thrombus aspiration was used in 25% of the procedures. We used instrumental variable analysis with administrative healthcare region as the treatment-preference instrumental variable to evaluate the effect of thrombus aspiration on mortality, stent thrombosis, and stroke. Thrombus aspiration was not associated with mortality at 30 days (risk reduction:  $-1.2$ ; 95% confidence interval [CI],  $-5.4$  to  $3.0$ ;  $P=0.57$ ) and 1 year (risk reduction:  $-2.4$ ; 95% CI,  $-7.6$  to  $3.0$ ;  $P=0.37$ ). Thrombus aspiration was associated with a lower risk of stent thrombosis both at 30 days (risk reduction:  $-2.7$ ; 95% CI,  $-4.1$  to  $-1.4$ ;  $P<0.001$ ) and 1 year (risk reduction:  $-3.5$ ; 95% CI,  $-5.3$  to  $-1.7$ ;  $P<0.001$ ). In-hospital stroke and neurologic complications did not differ between groups (risk reduction:  $0.1$ ; 95% CI,  $-0.8$  to  $1.1$ ;  $P=0.76$ ).

**Conclusions**—Mortality was not different between the groups. Thrombus aspiration was associated with decreased risk of stent thrombosis. Our study provides important evidence for the external validity of previous randomized studies regarding mortality. (*J Am Heart Assoc.* 2018;7:e007680. DOI: 10.1161/JAHA.117.007680.)

**Key Words:** myocardial infarction • thrombectomy • primary percutaneous coronary intervention

# Thrombus aspiration followed by direct stenting: A novel strategy of primary percutaneous coronary intervention in ST-segment elevation myocardial infarction. Results of the Polish-Italian-Hungarian RAndomized ThrombEctomy Trial (PIHRATE Trial)

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**Background** Previous studies with thrombectomy showed different results, mainly due to use of thrombectomy as an additional device not instead of balloon predilatation. The aim of the present study was to assess impact of aspiration thrombectomy followed by direct stenting.

**Methods** Patients with ST elevation myocardial infarction (STEMI) <6 hours from pain onset and occluded infarct-related artery in baseline angiography were randomized into aspiration thrombectomy followed by direct stenting (TS, n = 100) or standard balloon predilatation followed by stent implantation (n = 96). The primary end point of the study was the electrocardiographic ST-segment elevation resolution >70% (STR > 70%) 60 minutes after primary angioplasty (percutaneous coronary intervention [PCI]). Secondary end points included angiographic myocardial blush grade (MBG) after PCI, combination of STR > 70% immediately after PCI and MBG grade 3 (optimal myocardial reperfusion), Thrombolysis In Myocardial Infarction flow after PCI, angiographic complications, and in-hospital major adverse cardiac events.

**Results** Aspiration thrombectomy success rate was 91% (crossing of the lesion with thrombus reduction and flow restoration). There was no significant difference in STR  $\geq$  70% after 60 minutes (53.7% vs 35.1%,  $P = .29$ ). STR > 70% immediately after PCI (41% vs 26%,  $P < .05$ ), MBG grade 3 (76% vs 58%,  $P < .03$ ), and optimal myocardial reperfusion (35.1% vs 11.8%,  $P < .001$ ) were more frequent in TS. There was no difference in between the groups in 6-month mortality (4% vs 3.1%,  $P = .74$ ) and reinfarction rate (1% vs 3.1%,  $P = .29$ ).

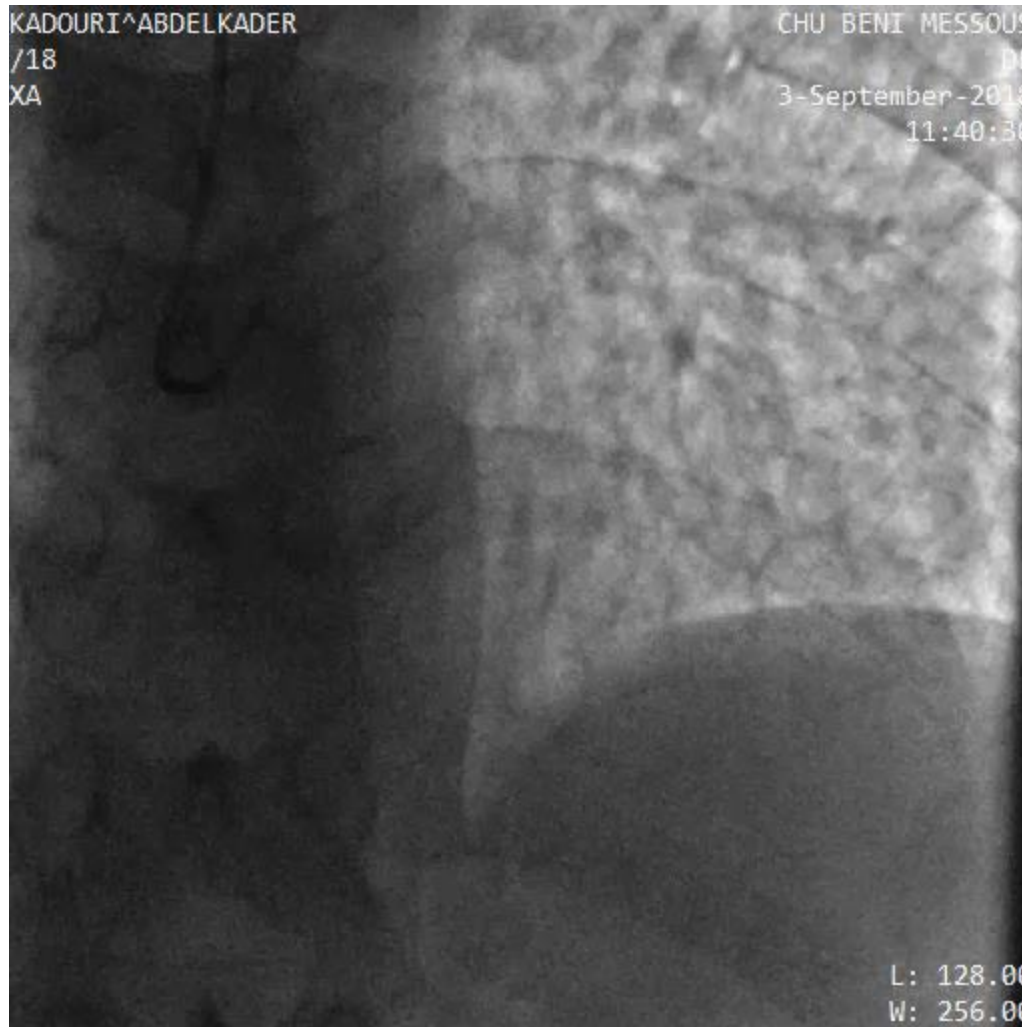
**Conclusions** Aspiration thrombectomy and direct stenting is safe and effective in STEMI patients with early presentation (<6 hours). The angiographic parameters of microcirculation reperfusion and ECG ST-segment resolution directly after PCI were significantly better in thrombectomy group despite the lack of the difference in ST-segment resolution 60 minutes after PCI. (Am Heart J 2010;160:966-72.)

	<b>Thrombectomy and direct stenting</b>	<b>Standard balloon predilatation and stenting</b>	<b>P</b>
Angiographic complications	16%	24.2%	.15
Distal embolization	5%	5.3%	.93
No-flow/slow-flow	10%	17.9%	.11
Bail out glycoprotein IIb/IIIa use	8%	10.5%	.54
Adenosine/ nitroprusside	3%	10.5%	.035
Stent implantation	99%	96.8%	.27
Direct stenting	75%	5.2%	<.0001
Stent diameter (mm)	3.31 ± 0.4	3.38 ± 0.5	.32
Stent length (mm)	19.46 ± 6.5	19.76 ± 5.9	.74
Maximal deployment pressure (atm)	15 ± 2.4	14.8 ± 1.9	.46

Direct stenting	75%	5.2%	<.0001
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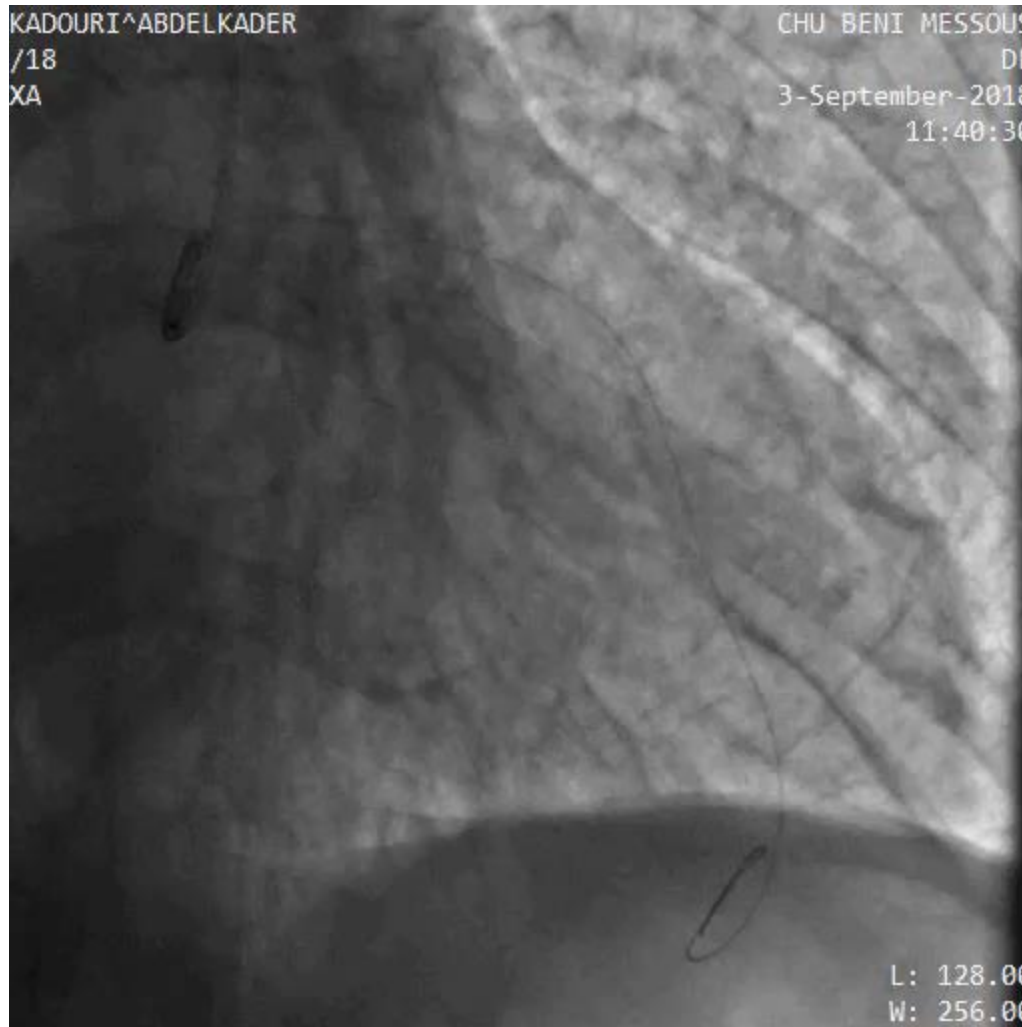
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# Thrombus Aspiration in ST Elevation Myocardial Infarction: An Individual Patient Meta-analysis

Sanjit S. Jolly, Stefan K. James, Vladimír Dzavík, John A. Cairns, Karim D. J. Al-Salim Yusuf, Göran K. Olivecrona, Henrik Renlund, Peggy Gao, Bo Lagerqvist, Sacko Kedev, Goran Stankovic, Brandi Meeks and Ole Frøen



Published online December 9, 2016;  
 American Heart Association, 7272 Greenville Avenue

circ.ahajournals.org/ by guest on December 9, 2016

						P(INTERACTION)
OVERALL	18306	221/9155 (2.4)	262/9151 (2.9)	0.84(0.7-1.01)		
TIMI Thrombus Grade:						
≥3	13576	170/6892 (2.47)	205/6684 (3.07)	0.8(0.65-0.98)		
<3	4635	49/2224 (2.2)	53/2411 (2.2)	1(0.68-1.47)		0.321
TIMI Thrombus Grade:						
≥4	10739	144/5376 (2.68)	174/5363 (3.24)	0.82(0.66-1.02)		
<4	7472	75/3740 (2.01)	84/3732 (2.25)	0.89(0.65-1.22)		0.666
Initial TIMI Flow:						
0-1	13678	195/6808 (2.86)	219/6870 (3.19)	0.9(0.74-1.09)		
2-3	4515	24/2286 (1.05)	42/2229 (1.88)	0.55(0.34-0.92)		0.078
Symptom onset (h):						
<6	14016	142/6958 (2.04)	181/7058 (2.56)	0.79(0.64-0.99)		

In those with high thrombus burden (≥ TIMI thrombus grade 3) thrombus aspiration was associated with reduced cardiovascular death (2.5% vs. 3.1%, hazard ratio 0.80; 95% CI 0.65-0.98, p= 0.03) with no significant heterogeneity across studies (study level interaction

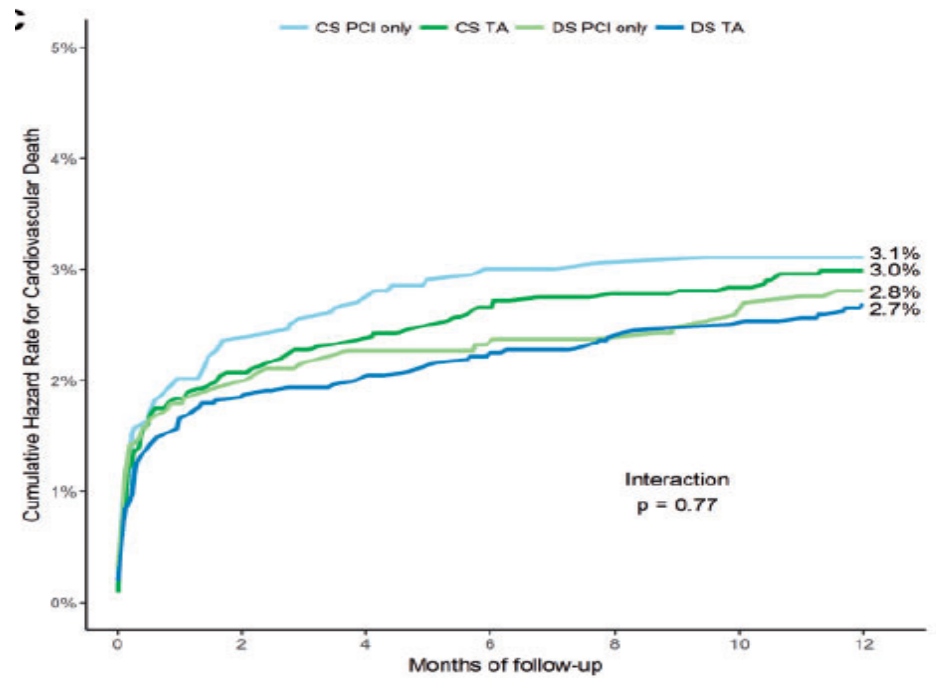
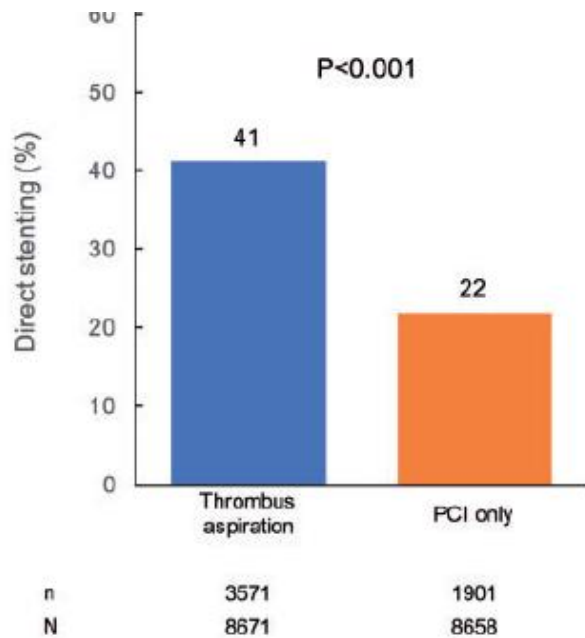
# Clinical impact of direct stenting and interaction with thrombus aspiration in patients with ST-segment elevation myocardial infarction undergoing percutaneous coronary intervention: Thrombectomy Trialists Collaboration

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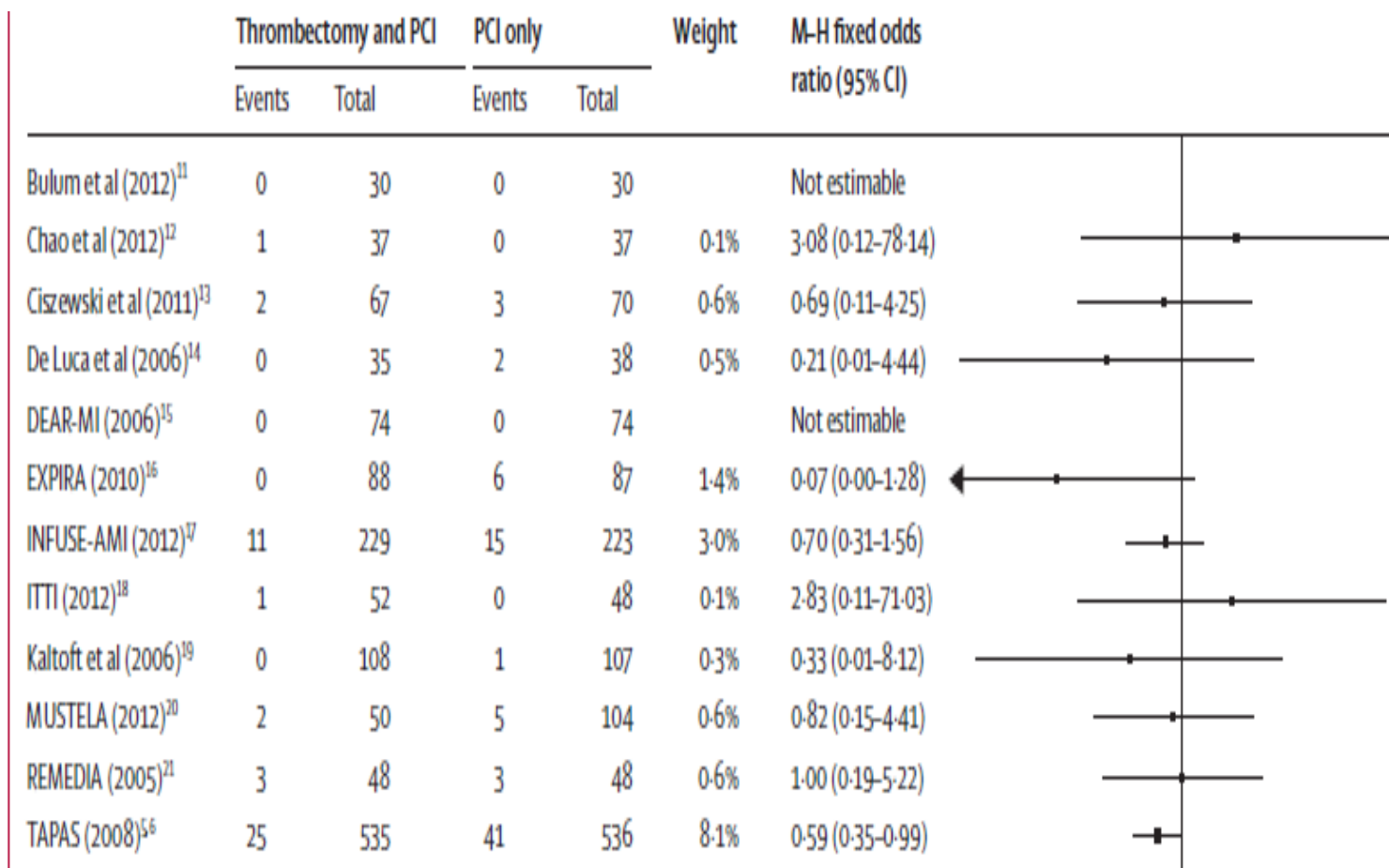
**Aims** Preliminary studies suggest that direct stenting (DS) during percutaneous coronary intervention (PCI) may reduce microvascular obstruction and improve clinical outcome. Thrombus aspiration may facilitate DS. We assessed the impact of DS on clinical outcome and myocardial reperfusion and its interaction with thrombus aspiration among ST-segment elevation myocardial infarction (STEMI) patients undergoing PCI.

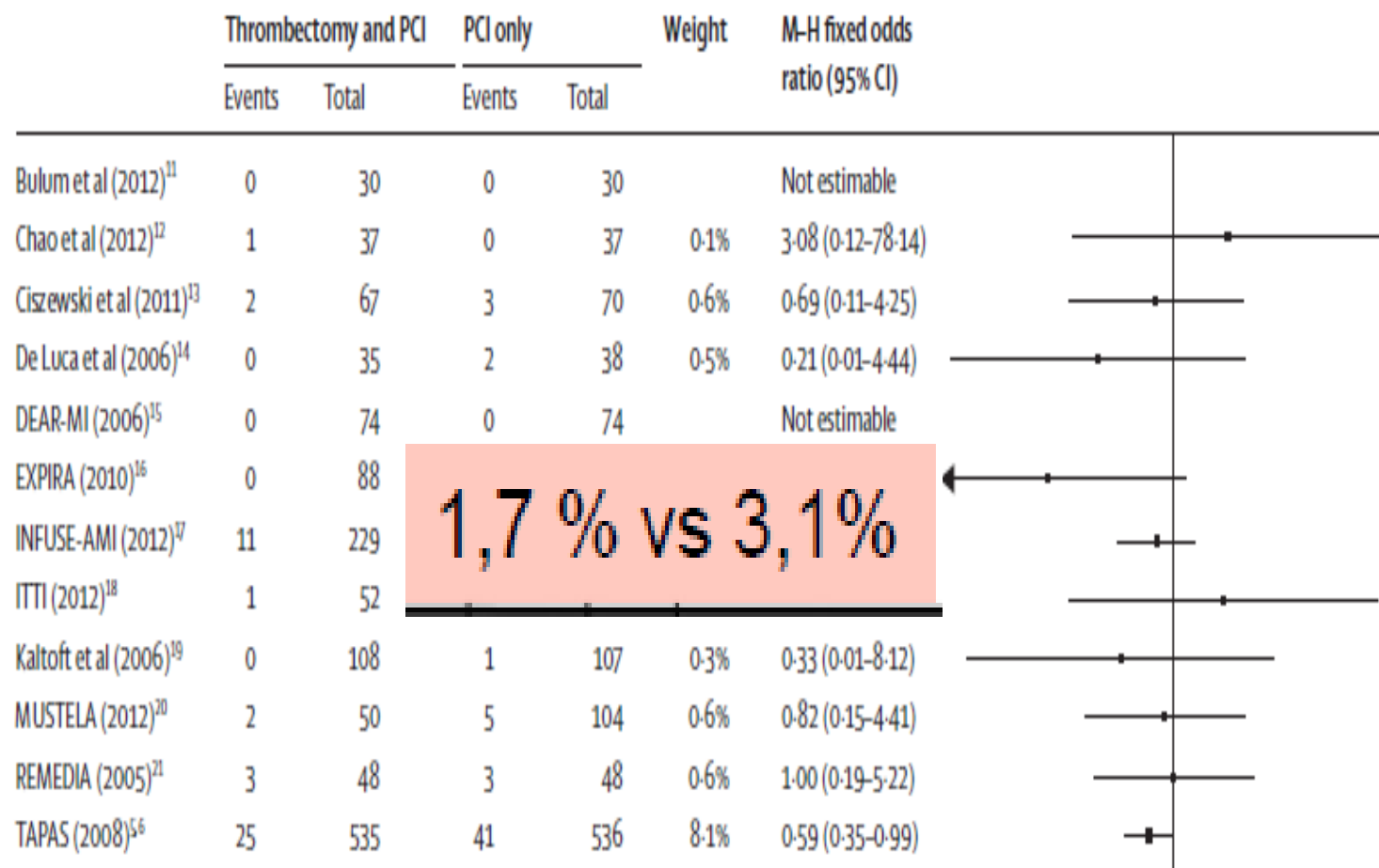
**Methods and results** Patient-level data from the three largest randomized trials on routine manual thrombus aspiration vs. PCI only were merged. A 1:1 propensity matched population was created to compare DS and conventional stenting. Synergy between DS and thrombus aspiration was assessed with interaction *P*-values in the final models. In the unmatched population (*n* = 17 329), 32% underwent DS and 68% underwent conventional stenting. Direct stenting rates were higher in patients randomized to thrombus aspiration as compared with PCI only (41% vs. 22%; *P* < 0.001). Patients undergoing DS required less contrast (162 mL vs. 172 mL; *P* < 0.001) and had shorter fluoroscopy time (11.1 min vs. 13.3 min; *P* < 0.001). After propensity matching (*n* = 10 944), no significant differences were seen between DS and conventional stenting with respect to 30-day cardiovascular death [1.7% vs. 1.9%; hazard ratio 0.88, 95% confidence interval (CI) 0.55–1.41; *P* = 0.60; *P*<sub>interaction</sub> = 0.96] and 30-day stroke or transient ischaemic attack (0.6% vs. 0.4%; odds ratio 1.02; 95% CI 0.14–7.54; *P* = 0.99; *P*<sub>interaction</sub> = 0.81). One-year results were similar. No significant differences were seen in electrocardiographic and angiographic myocardial reperfusion measures.

**Conclusion** Direct stenting rates were higher in patients randomized to thrombus aspiration. Clinical outcomes and myocardial reperfusion measures did not differ significantly between DS and conventional stenting and there was no interaction with thrombus aspiration.



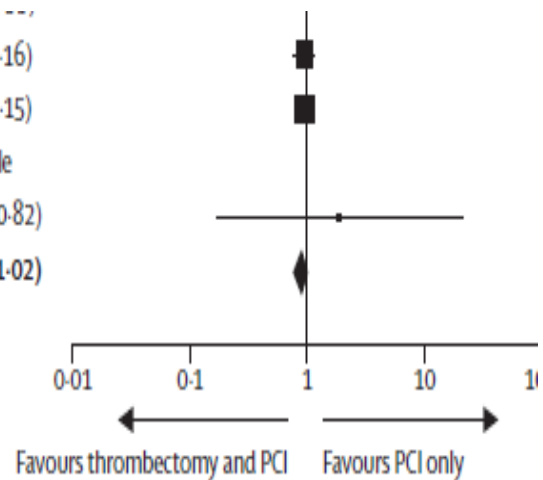
RECAPITULATIF !!!!





**1,7 % vs 3,1%**

TASTE (2014) <sup>7,8</sup>	191	3621	202	3623	39.8%	0.94 (0.77-1.16)
TOTAL	214	5035	224	5029	44.7%	0.95 (0.79-1.15)
TROFI (2013) <sup>22</sup>	0	71	0	70		Not estimable
VAMPIRE (2008) <sup>23</sup>	2	170	1	158	0.2%	1.87 (0.17-20.82)
<b>Total (95% CI)</b>		<b>10250</b>		<b>10282</b>	<b>100.0%</b>	<b>0.90 (0.79-1.02)</b>
Total events	452		503			
Heterogeneity $\chi^2=9.23$ , $df=12$ ( $p=0.68$ ); $I^2=0\%$						
Test for overall effect: $Z=1.62$ ( $p=0.10$ )						



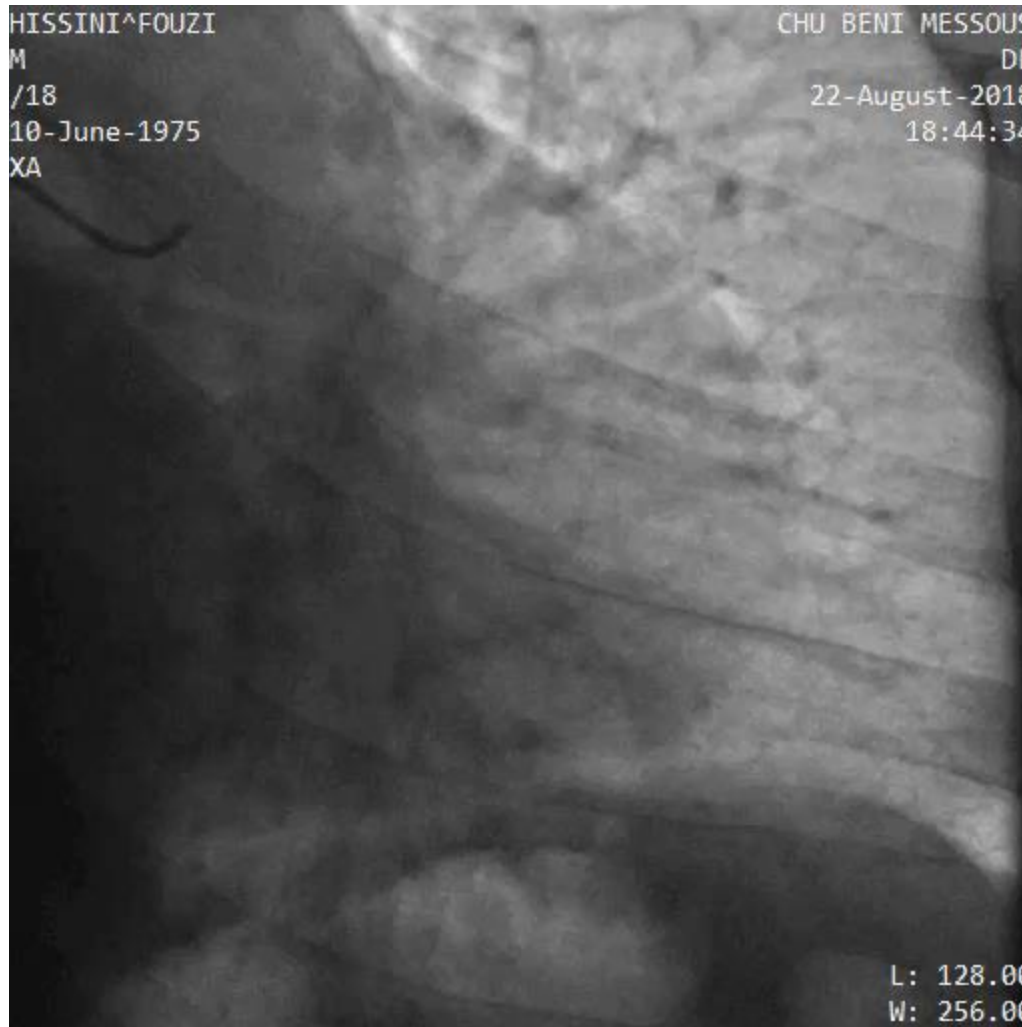


# THROMBO ASPIRATION SELECTIVE?

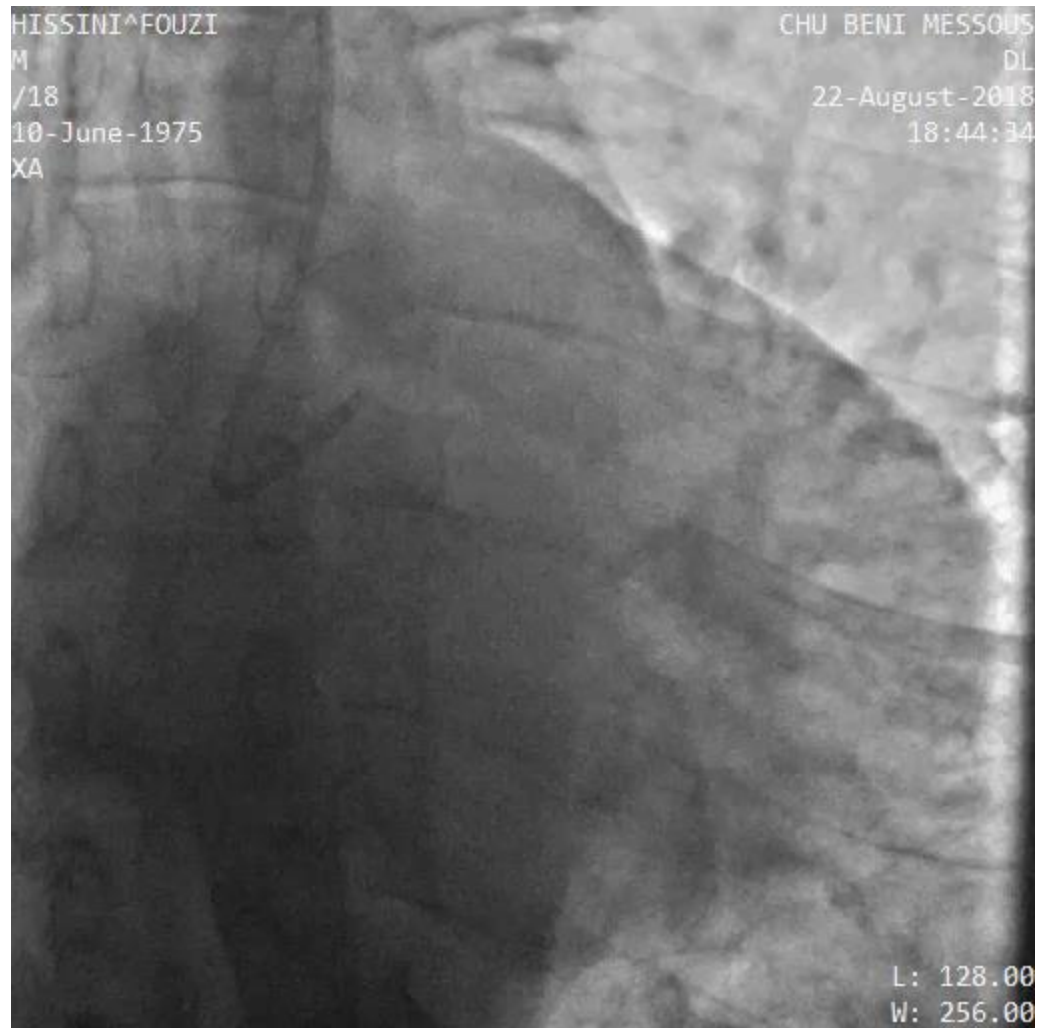
Homme 42 ans tabagique  
STEMI anterieur H4

HISSINI^FOUZI  
M  
/18  
10-June-1975  
XA

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DL  
22-August-2018  
18:44:34

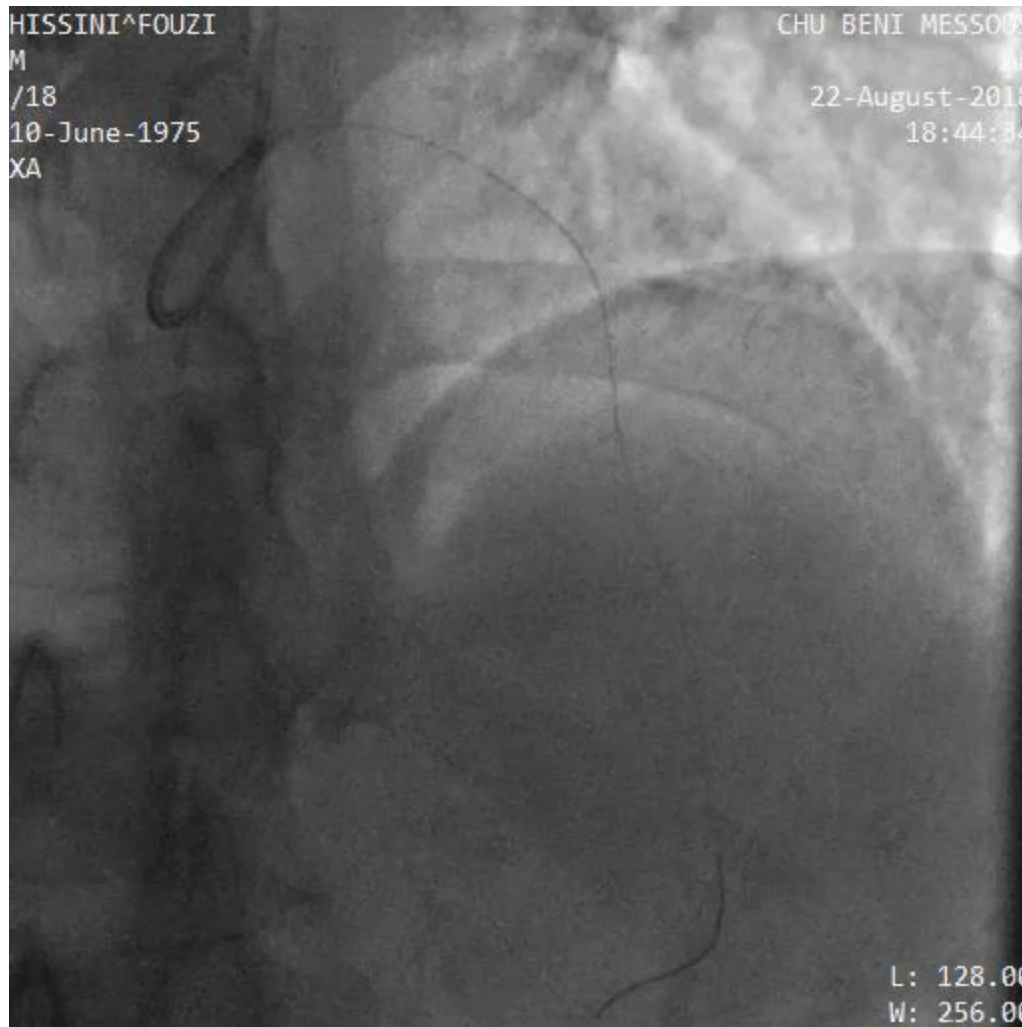


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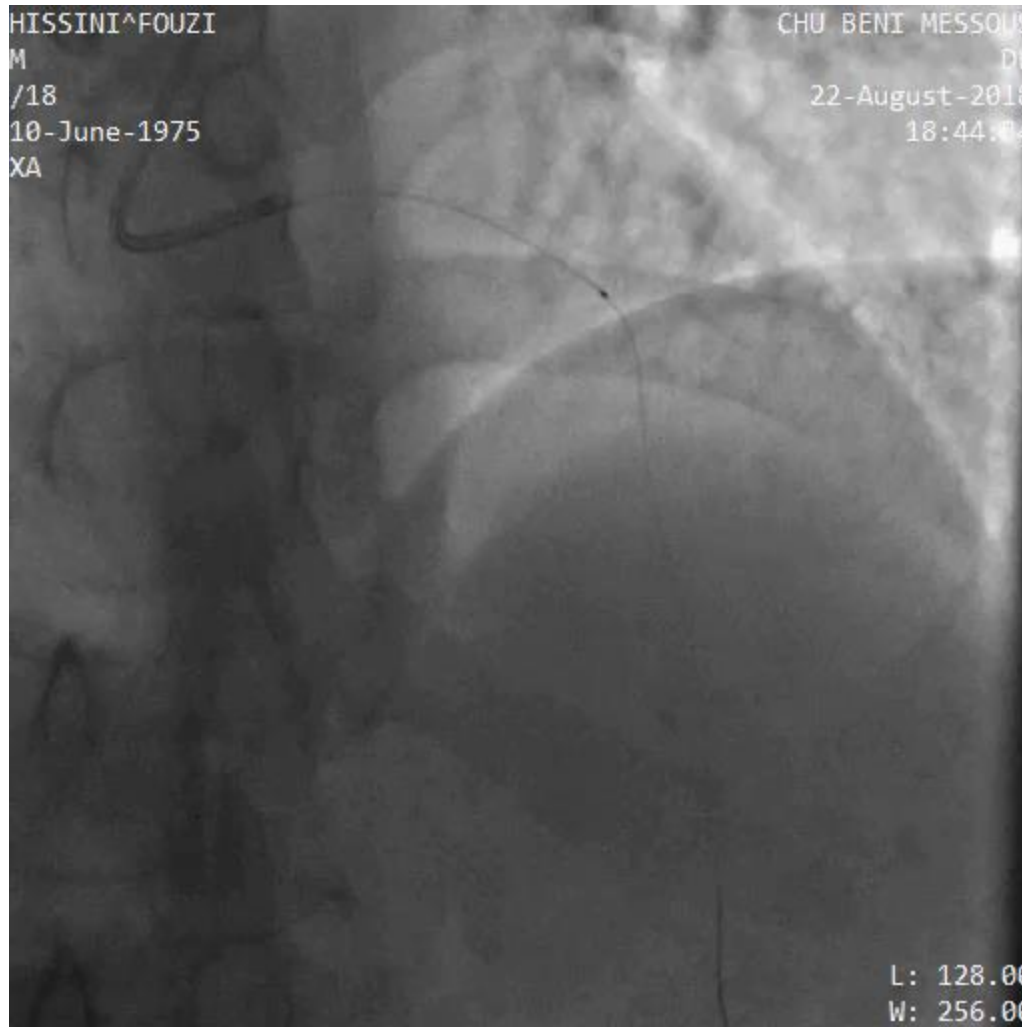
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L: 128.00  
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HISSINI^FOUZI  
M  
/18  
10-June-1975  
XA

CHU BENI MESSOUS  
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L: 128.00  
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HISSINI^FOUZI  
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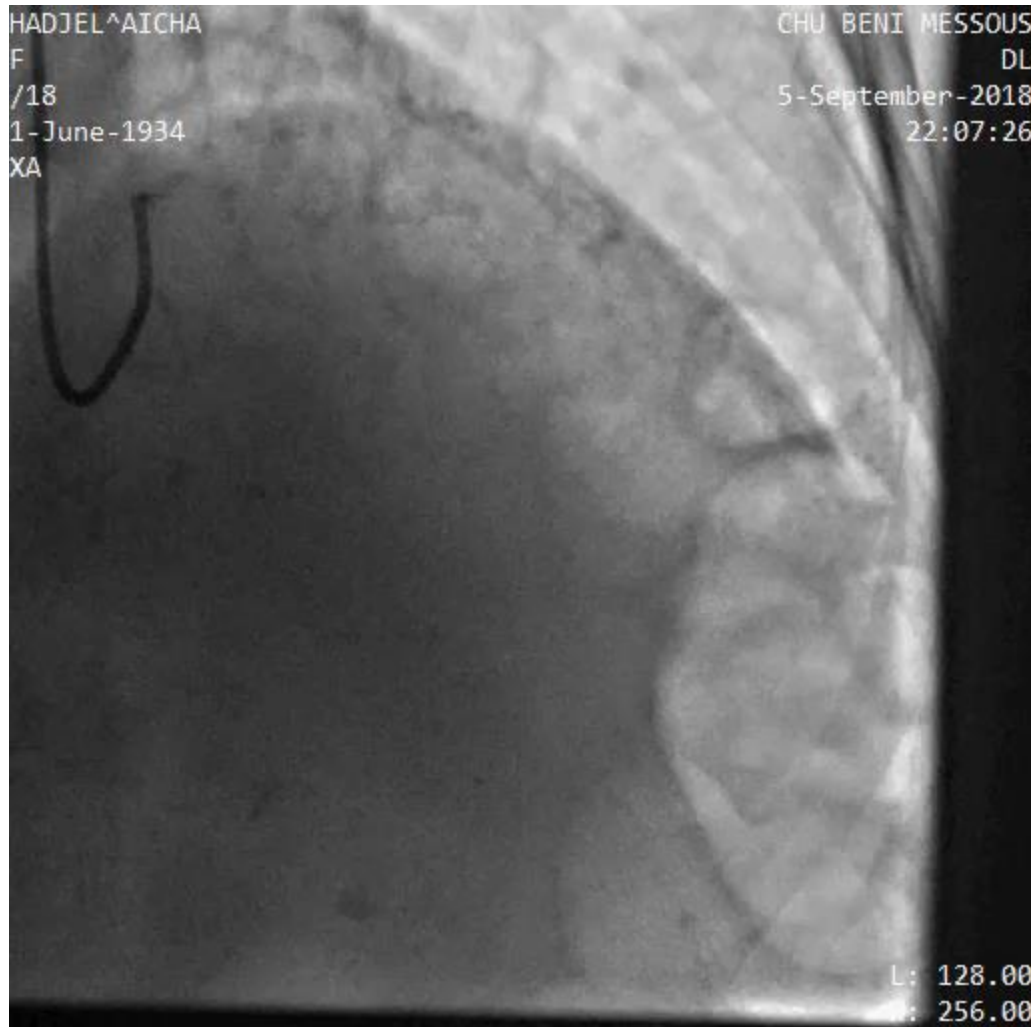
L: 128.00  
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- Femme 78 ans
- STEMI antero septal
- AVC ischémique étendue concomitant



HADJEL^AICHA  
F  
/18  
1-June-1934  
XA

CHU BENI MESSOUS  
DL  
5-September-2018  
22:07:26



L: 128.00  
: 256.00

HADJEL^AICHA  
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XA

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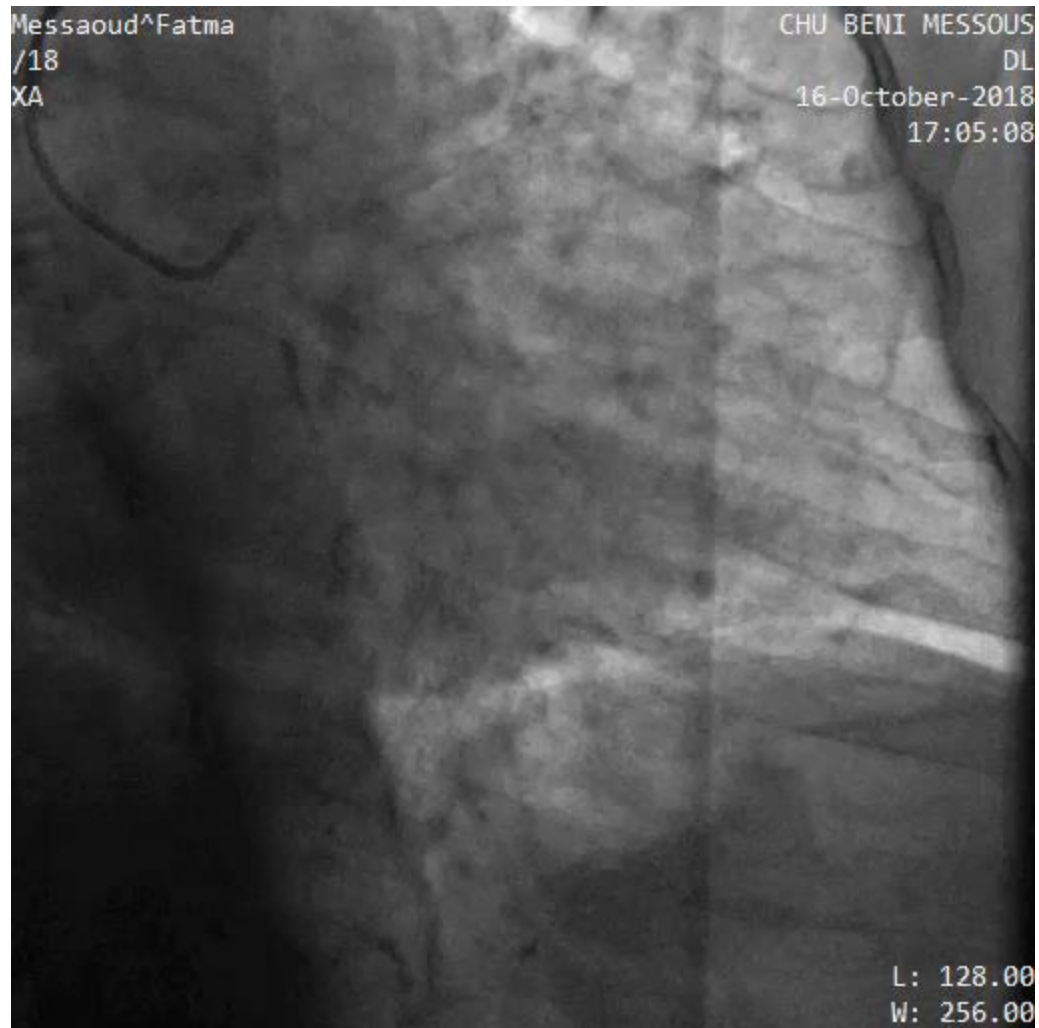
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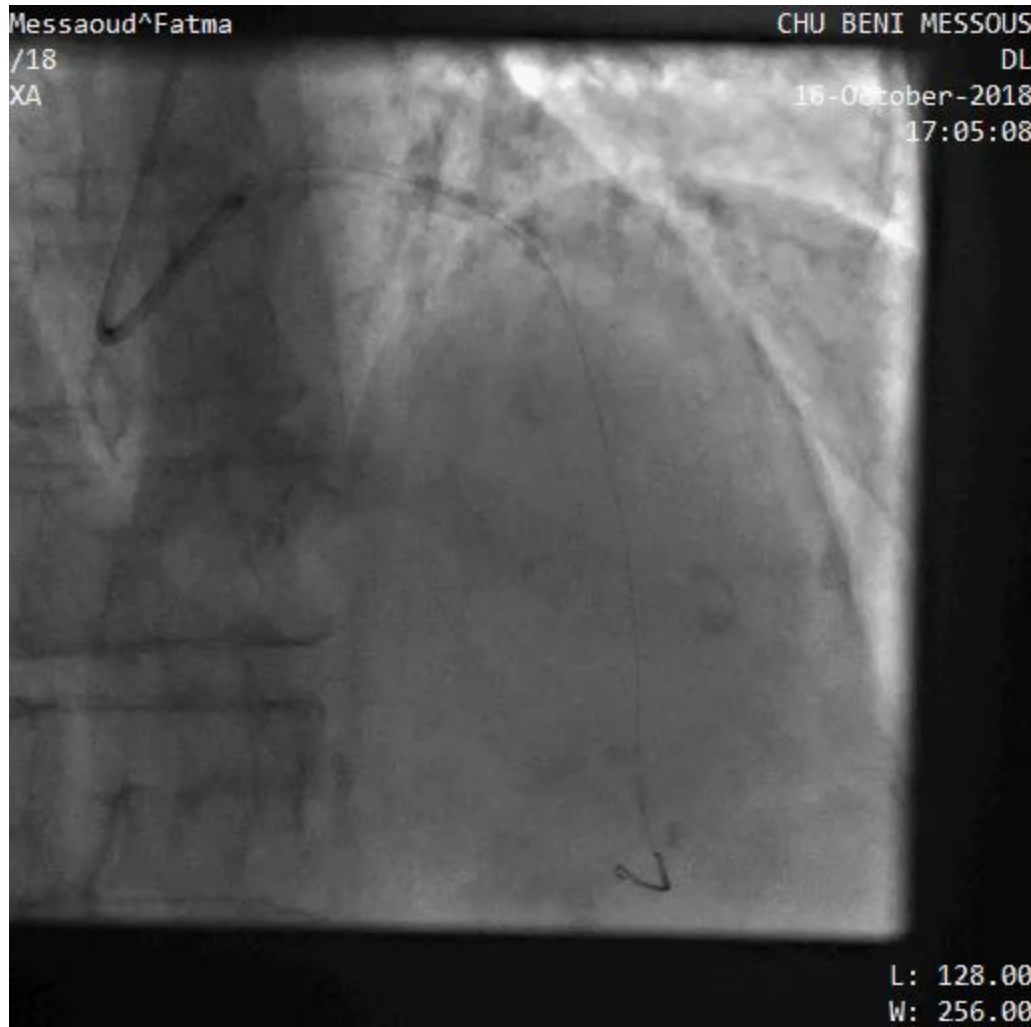
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- Femme 83 ans
- STEMI anterieur
- Ulcere gastrique evolutif



Messaoud^Fatma  
/18  
XA

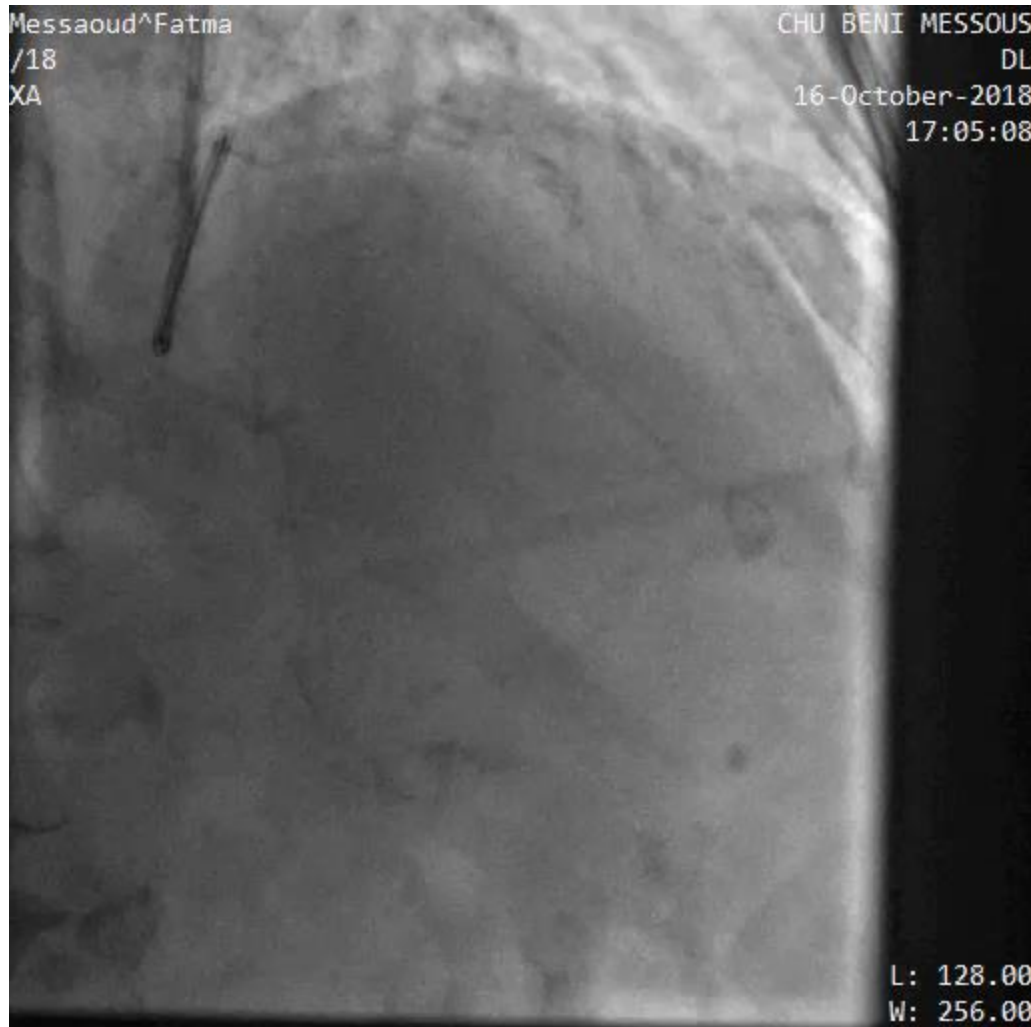
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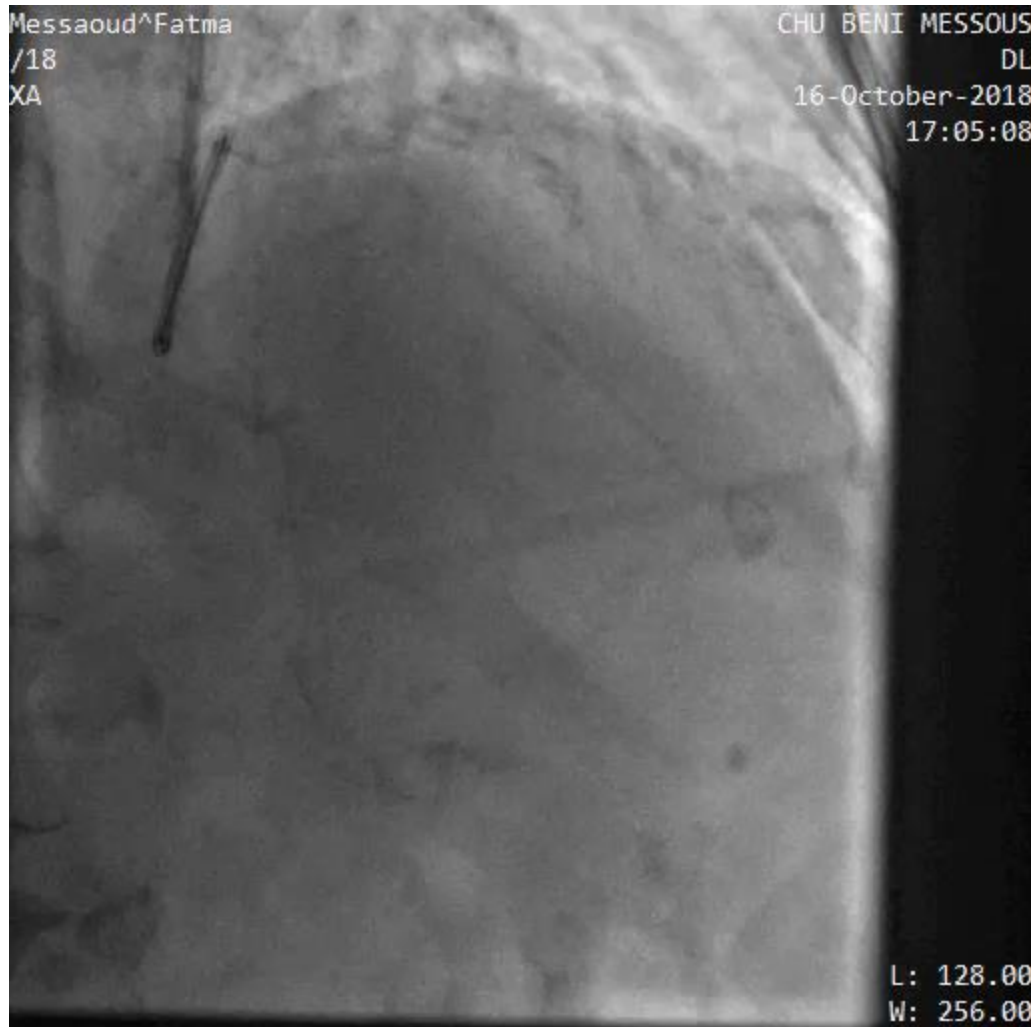
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L: 128.00  
W: 256.00

Messaoud^Fatma  
/18  
XA

CHU BENI MESSOUS  
DL  
16-October-2018  
17:05:08



L: 128.00  
W: 256.00



# TAKE HOME MESSAGES

- TA est une technique simple
- Non dénuée de risque(TOTAL)
- Pas d'effet sur la mortalité
- Meilleure visibilité de l'artère
- Réduction de la charge thrombotique
- Patients sélectionnés:
- jeune, TIMI 0/1 après guide, échec au ballon

Merci