Hur transfunderar vi efter den kritiska situationen och risker för tromboembolism?

Anna Ågren
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Koagulationsmottagningen
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Mål med transfusionsstrategi efter den kritiska situationen

Undvika postoperativ blödning	Undvika postoperativ trombos	Undvika andra postoperativa komplikationer

Coagulation and transfusion in the postoperative bleeding patient

Sibylle A. Kozek-Langenecker

- Optimera calciumnivå, temperatur och pH
- Optimera koagulation och hematokrit
- Kombinationen av flera mindre koagulationsdefekter kan leda till ökad blödningsrisk

Curr Opin Crit Care. 2014 Aug;20(4):460-6

SEPTEMBER 26, 2013

The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE

CRITICAL CARE MEDICINE

Simon R. Finfer, M.D., and Jean-Louis Vincent, M.D., Ph.D., *Editors*

Resuscitation Fluids

John A. Myburgh, M.B., B.Ch., Ph.D., and Michael G. Mythen, M.D., M.B., B.S.

”Currently, no ideal resuscitation fluid exists”

”The selection of the specific fluid should be based on indications, contraindication and potential toxic effects”

SHOCK, Vol. 41, Supplement 1, pp. 47–50, 2014

Review Article

IS THERE A PLACE FOR CRYSTALLOIDS AND COLLOIDS IN REMOTE DAMAGE CONTROL RESUSCITATION?

Christian Medby[*†]

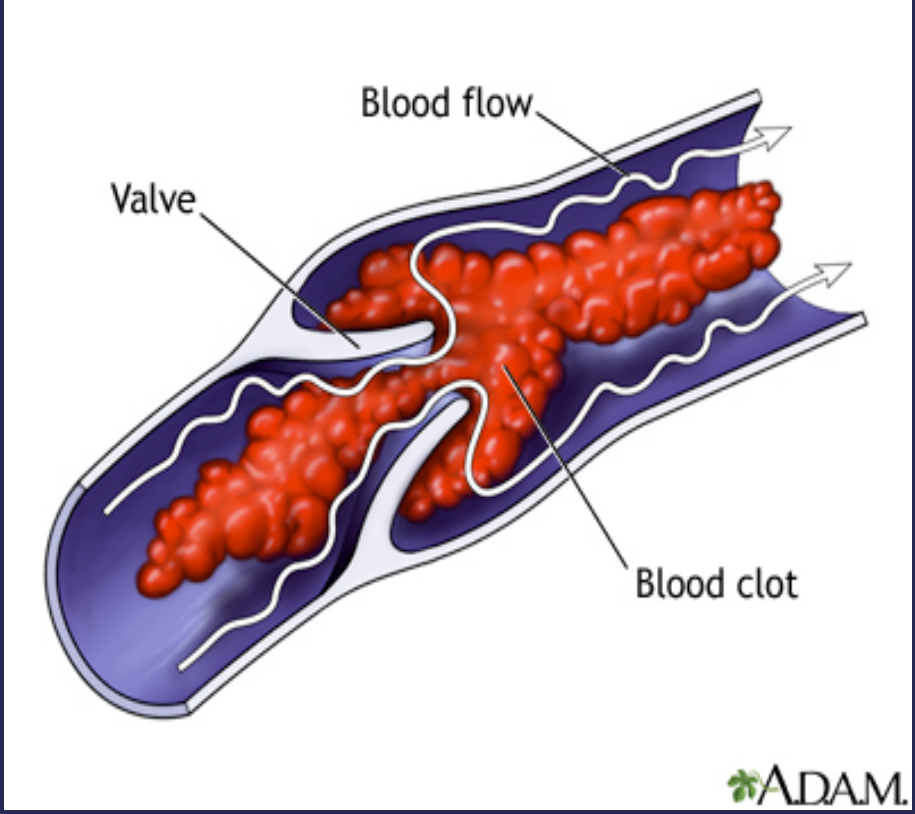
TABLE 1. **Effects on coagulation and volume expansion of different crystalloids and colloids**

Volume expander	Commercial name	Mechanism of coagulopathy
Plasma	LyoPlas	None
Albumin 4%	Albunorm	Dilution only
Albumin 20%	Flexbumin	Dilution only
Saline	Natriumklorid	Dilution only
Ringer's	Ringer-Acetat	Dilution only
Gelatins	Haemaccel	Impaired platelet aggregation
Low-molecular-weight HES	Voluven	Acquired fibrinogen deficiency
Medium-molecular-weight HES	Hestril	Acquired fibrinogen deficiency
High-molecular-weight HES	Hextend	Acquired fibrinogen deficiency
Dextran	Macrodex	Reduction of vWF and FVIII Accelerated fibrinolysis

Sammanfattning- hur transfunderar vi efter den kritiska situationen?

- Inga klara riktlinjer?
- Optimera calciumnivå, temperatur, pH, koagulation samt hematokrit
- Alla kolloider och kristalloider påverkar koagulationen på något sätt …
- ….antingen med spädning eller direkt påverkan

Risker för tromboembolism

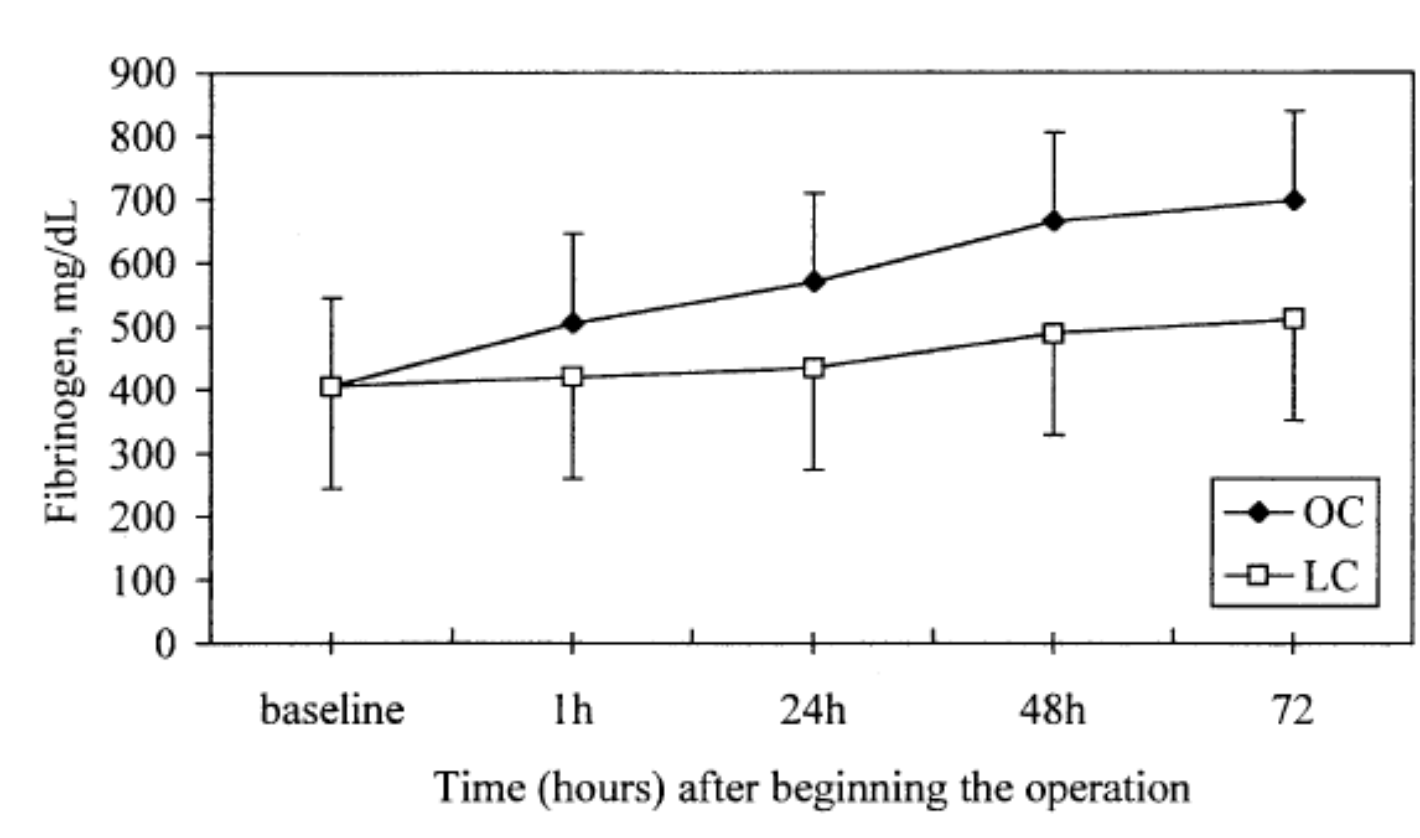


Changes in the blood coagulation, fibrinolysis, and cytokine profile during laparoscopic and open cholecystectomy

M. Schietroma,[1] F. Carlei,[1] A. Mownah,[2] L. Franchi,[1] C. Mazzotta,[1] A. Sozio,[1] G. Amicucci[1]

Surg Endosc (2004) 18: 1090–1096

Fibrinogen– förändringar i samband med kirurgi

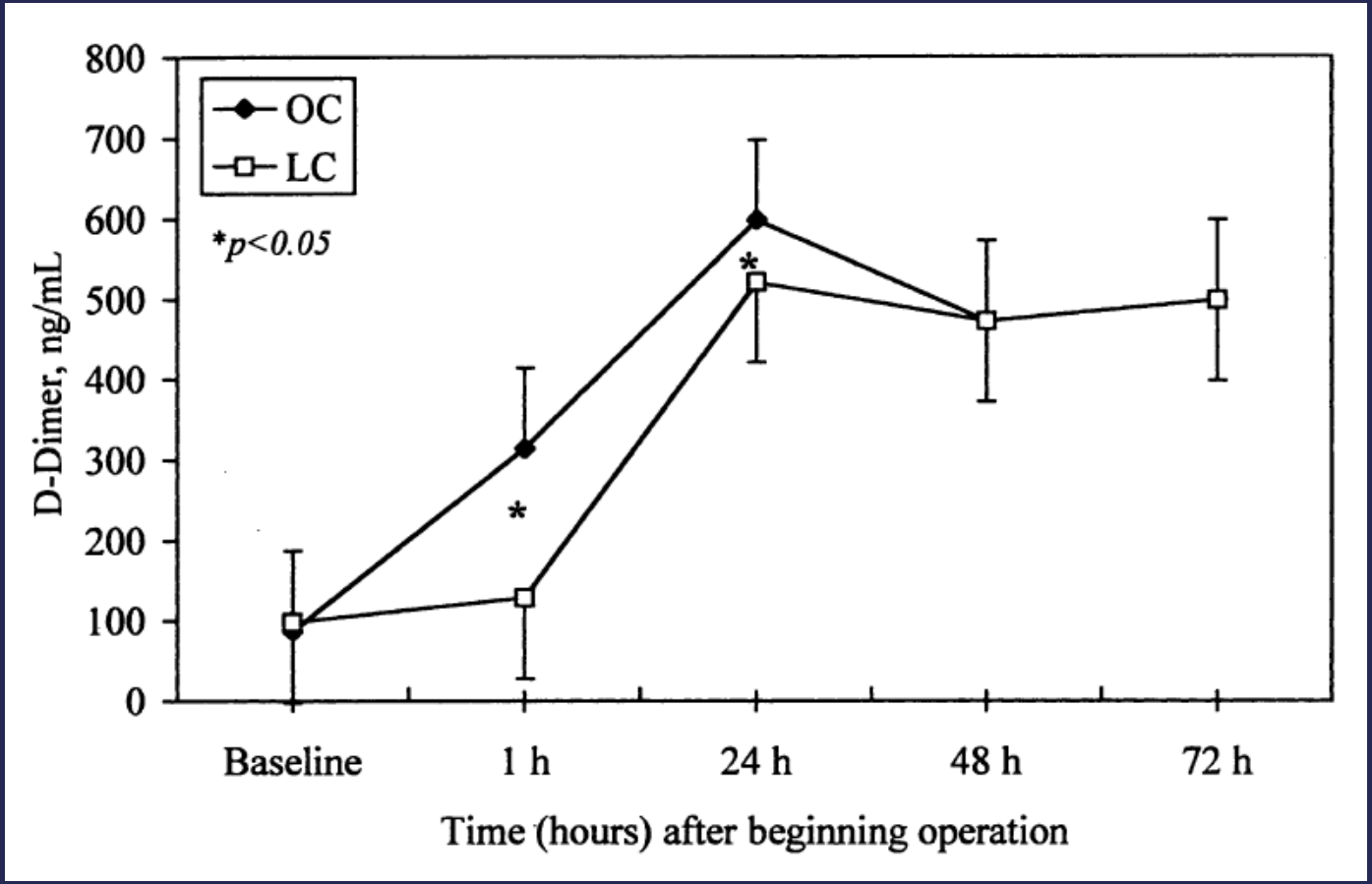


$p < 0.05$ for all values compared with baseline

OC open cholecystectomi (n=35)
LC Laparoscopic cholecystectomi (n=36)

Surg Endosc (2004) 18: 1090–1096

D-Dimer– förändringar i samband med kirurgi



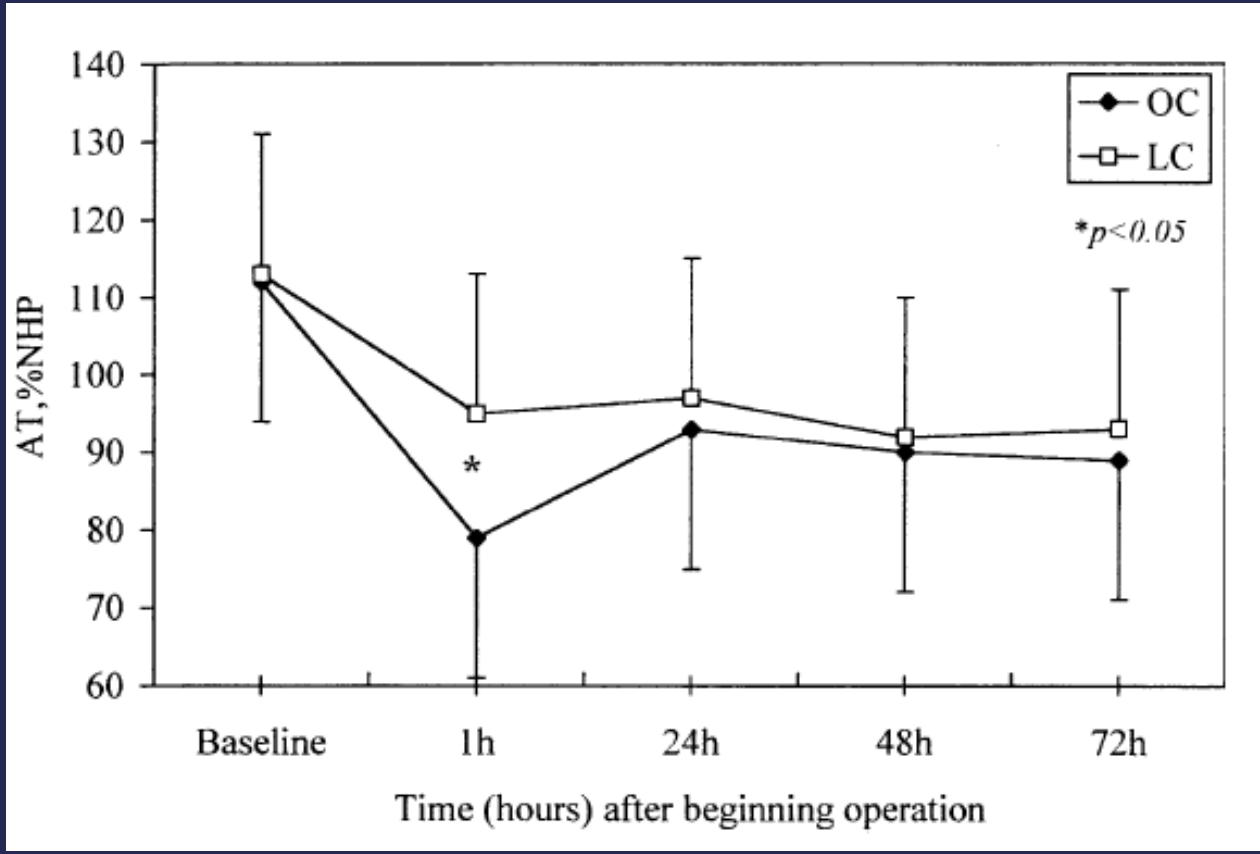
$p < 0.05$ for all values compared with baseline

OC open cholecystectomi (n=35)
LC Laparoscopic cholecystectomi (n=36)

Surg Endosc (2004) 18: 1090–1096

Antitrombin– förändringar i samband med kirurgi

NPH%:
% Normal
Human
Plasma



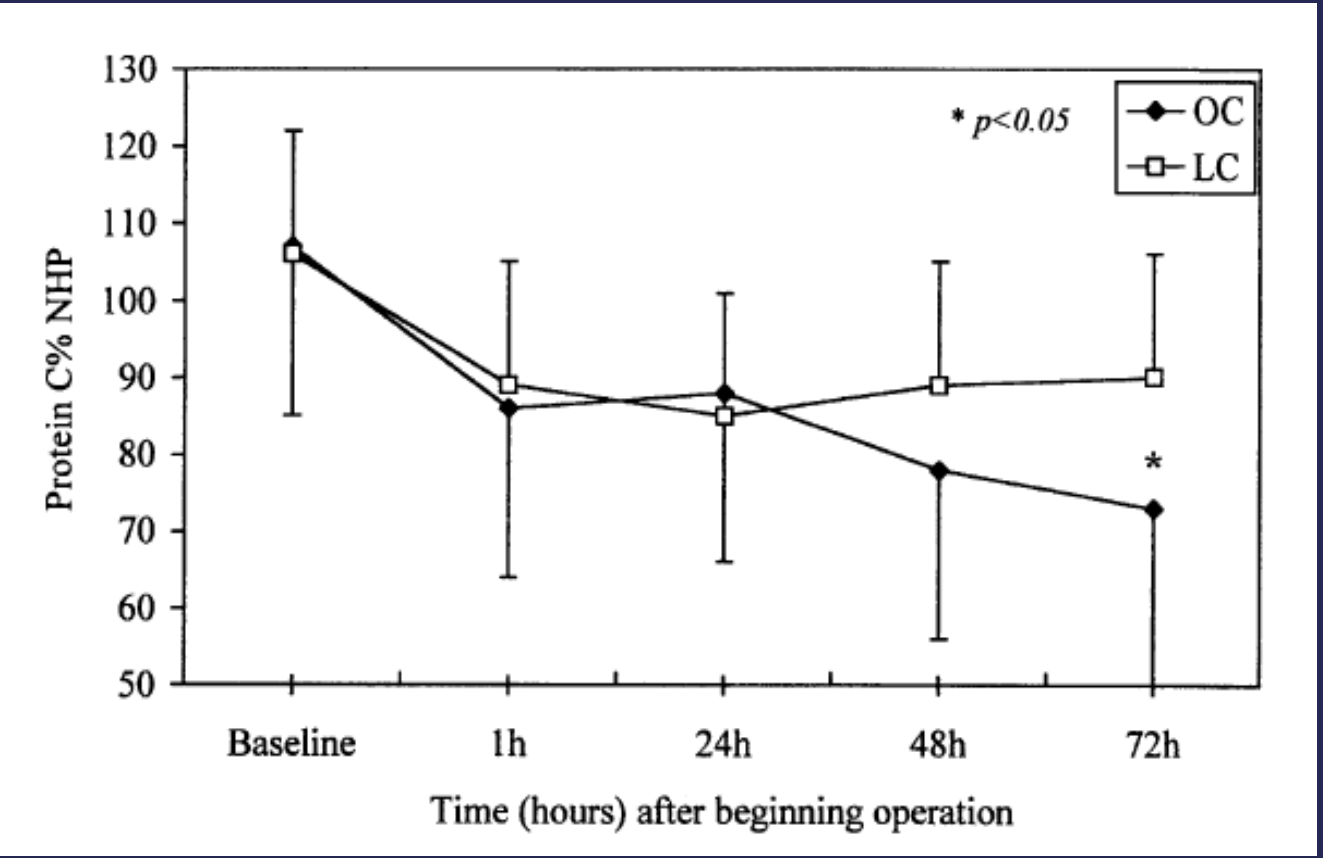
$p < 0.05$ for all values compared with baseline

OC open cholecystectomi (n=35)
LC Laparoscopic cholecystectomi (n=36)

Surg Endosc (2004) 18: 1090–1096

Protein C – förändringar i samband med kirurgi

NPH%:
% Normal Human Plasma



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OC open cholecystectomi (n=35)
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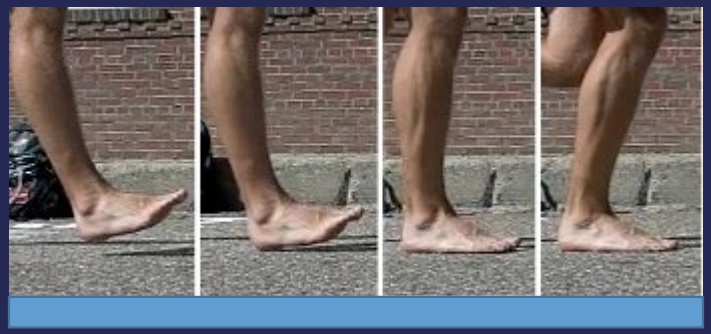
Surg Endosc (2004) 18: 1090–1096

Virchows triad – risker för venös trombos

Hyperkoagulabilitet

Skada på kärlvägg

Venös stas



Laparoscopic Surgery Is Associated With a Lower Incidence of Venous Thromboembolism Compared With Open Surgery

- Registerstudie
- 138 595 patienter
- 46 105 öppen kirurgi
- 92 490 laparoskopisk kirurgi
- 0,59 % med venös tromboembolism vid öppen kirurgi
- 0,28% med venös tromboembolism vid laparoskopisk kirurgi

Nguygen et al.Ann Surg. 2007 Dec;246(6):1021-7

Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): a randomised, placebo-controlled trial

*CRASH-2 trial collaborators**

- 244 sjukhus i 40 länder
- 10 096 patienter fick tranexamsyra
- 10 115 patienter fick placebo

	Tranexamic acid (n=10 060)	Placebo (n=10 067)	RR (95% CI)	p value
Vascular occlusive events*				
Any vascular occlusive event	168 (1·7%)	201 (2·0%)	0·84 (0·68–1·02)	0·084
Myocardial infarction	35 (0·3%)	55 (0·5%)	0·64 (0·42–0·97)	0·035
Stroke	57 (0·6%)	66 (0·7%)	0·86 (0·61–1·23)	0·42
Pulmonary embolism	72 (0·7%)	71 (0·7%)	1·01 (0·73–1·41)	0·93
Deep vein thrombosis	40 (0·4%)	41 (0·4%)	0·98 (0·63–1·51)	0·91

Lancet 2010; 376: 23–32

Impact of Preoperative Fibrinogen Concentration on Postoperative Outcome in Patients Who Received Dual Antiplatelet Therapy in Proximity to Off-Pump Coronary Bypass Surgery

Na Young Kim, MD; Jae-Kwang Shim, MD, PhD; Jong Wook Song, MD;
Eui-Kyung Kim, MD; Young-Lan Kwak, MD, PhD

Circ J. 2014;78(7):1661-6.

Table 2. Operative Characteristics and Perioperative Outcomes in Relation to Tertile Distribution of Preoperative Fibrinogen Concentration

	Preoperative fibrinogen concentration (mg/dl)			
	First tertile (n=181)	Second tertile (n=178)	Third tertile (n=179)	P value
	96–305	306–369	370–854	
No. of grafts	3.2±0.7	3.2±0.8	3.3±0.8	0.473
Duration of surgery, min	239±46	233±42	232±46	0.286
Perioperative blood loss, ml	1,134±401	1,067±472	1,005±380	0.014
Postoperative MI	10 (6)	17 (10)	25 (14)	0.025
Composite of morbidity endpoints	25 (14)	37 (21)	53 (30)	0.001
Duration of ICU stay, days	2±1	3±2	3±1	0.023
Duration of hospitalization, days	10±4	10±6	12±8	<0.001

Major morbidity endpoints definition of Society of Thoracic Surgeons Risk Model; permanent stroke,renal failure, prolonged ventilator care >24 h, deep sternal wound infection, 30-day operative mortality, and reoperation.

Prevalence, predictors and outcome of hypofibrinogenaemia in trauma: a multicentre observational study

- 1133 patients in four trauma centers (USA, UK, Norway)
- Conventional plasma fibrinogen on admission to the hospital
- Plasma fibrinogen < 2.29 g/L was associated with increased mortality.

Hagemo et al Crit Care 2014

Scandinavian Journal of Clinical & Laboratory Investigation, 2013; 73: 214–220

informa
healthcare

ORIGINAL ARTICLE

Thromboelastography (TEG®) compared to conventional coagulation tests in surgical patients – a laboratory evaluation

ANNA ÅGREN[1,2], AGNETA TAUNE WIKMAN[3], MARGARETA HOLMSTRÖM[1], ANDERS ÖSTLUND[4] & GUSTAF EDGREN[5]

TEG® Functional Fibrinogen Analysis May Overestimate Fibrinogen Levels

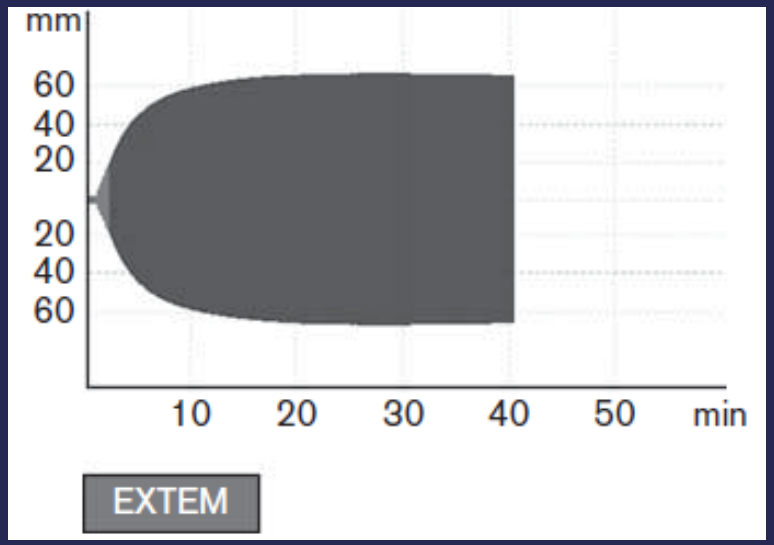
Anna Ågren, MD, PhD,*† Agneta Taune Wikman, MD, PhD,†§ Anders Östlund, MD, PhD,‖ and Gustaf Edgren, MD, PhD¶*

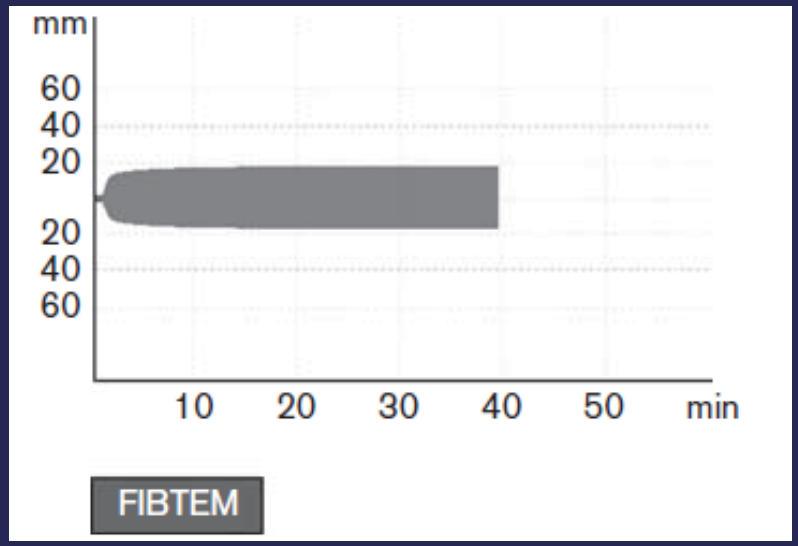
	TEG funktionellt fibrinogen	Plasma fibrinogen	P-värde
Patienter n=63	3,3 g/L	2,3 g/L	p<0.0001
Kontroller n=38	3,7 g/L	2,7 g/L	p<0.0001

- Medelvärdet för skillnaden var 1.0 g/L (95% CI för skillnaden 0.8–1.2 g/L, $p < 0.0001$) I båda grupperna.
- 28 individer hade fibrinogennivåer som var mindre än 2 g/L med plasma fibrinogenmetoden
- 86% av dessa värden under 2 g/L missades när man analyserade med TEG

Anesth Analg. 2014 May;118(5):933-5

Fibrinogen/fibrin – inhibering av trombocyter





TEG

- GPIIb/IIIa receptor inhibitor (Abciximab)

ROTEM

- Cytochalasin D
- Fibtem plus….
- också GPIIb/IIIa receptor inhibitor (tirofiban)

Lang et al. J Thromb Haemost 2004

Thrombelastography and rotational thromboelastometry early amplitudes in 182 trauma patients with clinical suspicion of severe injury

Trauma inducerad koagulopati definerades som PK(INR) > 1.2

TABLE 2.

	All		INR ≤ 1.2		INR > 1.2	
	Median	IQR	Median	IQR	Median	IQR
FF MA, mm	16.8	(13.9–19.5)	17.0	(14.3–19.9)	13.6	(10.9–16.9)
FIBTEM MCF, mm	13	(10–17)	13	(11–17)	10	(7–13)

TEG Referensvärden för funktionellt fibrinogen (FF MA) 10-25 mm

ROTEM Referensvärden för Fibtem MCF 9-25 mm

Meyer et al, J Traum Acute Care Surg 2014

Sammanfattning risker för trombos

- Postoperativt sker en ökning av koagulationsfaktorer och en minskning av koagulationshämmare
- Omfattning och typ av kirurgi, samt immobilisering påverkar risken för trombos
- Sannolikt fördelaktigt att ge vissa koagulationsfaktorpreparat peroperativt till en massivt blödande patient..
- ….men om detta innebär ökad risk för postoperativt trombos-insjuknande/ökad mortalitet är ännu helt ej kartlagt
- Fibrinogennivå ej lika om man analyserar med TEG eller ROTEM eller i plasma varför studieresultat är svåra att jämföra

Tack för uppmärksamheten!

Gamla Karolinska

Nya Karolinska
Ej öppningsbara fönster