

## Supplementary Online Content

Kokotovic D, Bisgaard T, Helgstrand F. Long-term recurrence and complications associated with elective incisional hernia repair. *JAMA*. doi:10.1001/jama.2016.15217

**eTable 1.** Bivariable and Multivariable Analysis of Risk Factors for the Need to Repair Recurrent Hernia

**eTable 2.** Propensity Adjusted Multivariable Analysis of Risk Factors for Mesh-Related Complications

**eTable 3.** Bivariable and Multivariable Analysis of Risk Factors for Mesh-Related Complications

**eFigure.** Study Consort Diagram

This supplementary material has been provided by the authors to give readers additional information about their work.

**eTable 1.** Bivariable and Multivariable Analysis of Risk Factors for the Need to Repair Recurrent Hernia

Open Mesh	Sample size, n	Crude events of recurrence, n	Bivariable analysis			Multivariable analysis		
			HR	(95% CI)	p-value	HR	95% CI	p-value
<b>Sex</b>								
Male	547	69	1	(Reference)		1	(Reference)	
Female	572	79	1.07	(0.78-1.48)	0.67	1.08	(0.78-1.50)	0.64
<b>Age</b>								
18 – 50	267	47	1	(Reference)		1	(Reference)	
51 – 60	324	45	0.82	(0.54-1.23)	0.33	0.82	(0.55-1.24)	0.35
61 – 70	301	36	0.68	(0.44-1.06)	0.09	0.68	(0.44-1.05)	0.08
> 70	227	20	0.53	(0.31-0.89)	0.02	0.54	(0.32-0.91)	0.02
<b>Hernia size, cm</b>								
0 – 2	166	14	1	(Reference)		1	(Reference)	
3 – 7	463	60	1.61	(0.90-2.88)	0.11	1.59	(0.89-2.86)	0.12
8 – 15	311	48	1.99	(1.10-3.61)	0.02	1.99	(1.09-3.60)	0.03
16 – 20	133	20	2.00	(1.01-3.67)	0.05	2.07	(1.04-4.11)	0.04
> 20	46	6	1.91	(0.74-4.98)	0.18	2.06	(0.79-5.40)	0.14
<b>Hernia type</b>								
Primary	921	113	1	(Reference)		1	(Reference)	
Recurrent	168	35	1.48	(1.01-2.16)	0.04	1.38	(0.95-2.03)	0.10
<b>Mesh position</b>								
Sublay	322	34	1	(Reference)		1	(Reference)	
Onlay	451	71	1.49	(0.99-2.24)	0.06	1.46	(0.97-2.20)	0.07
Intraper	255	33	1.27	(0.79-2.05)	0.33	1.31	(0.81-2.11)	0.28
Other #	91	10	1.03	(0.51-2.09)	0.93	1.12	(0.55-2.27)	0.75
<b>Laparoscopic Mesh</b>								
<b>Sex</b>								
Male	805	89	1	(Reference)		1	(Reference)	
Female	952	108	1.09	(0.77-1.35)	0.90	1.05	(0.79-1.40)	0.72
<b>Age</b>								
18 – 50	462	66	1	(Reference)		1	(Reference)	
51 – 60	498	44	0.61	(0.42-0.90)	0.01	0.59	(0.40-0.87)	0.01
61 – 70	456	58	0.92	(0.65-1.31)	0.64	0.87	(0.61-1.25)	0.46
> 70	341	29	0.62	(0.40-0.95)	0.03	0.59	(0.38-0.92)	0.02
<b>Hernia size, cm</b>								
0 – 2	101	7	1	(Reference)		1	(Reference)	

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3 – 7	676	64	1.34	(0.61-2.91)	0.47	1.37	(0.63-2.98)	0.44
8 – 15	692	93	1.98	(0.92-4.27)	0.08	2.15	(0.99-4.66)	0.05
16 – 20	209	20	1.34	(0.58-3.26)	0.46	1.53	(0.64-3.64)	0.34
> 20	79	13	2.57	(1.03-6.44)	0.04	2.80	(1.11-7.08)	0.03
Hernia type								
Recurrent	155	42	1	(Reference)		1	(Reference)	
Primary	1409	348	0.91	(0.65-1.28)	0.60	0.92	(0.65-1.30)	0.64
Mesh fixation								
Tack	1675	179	1	(Reference)		1	(Reference)	
Non-tack	82	18	0.45	(0.27-0.72)	0.001	0.45	(0.28-0.73)	0.001

All variables in table are included in the multivariable analyzes. n = number of patients. Intraper = intraperitoneal. HR = Hazard ratio. CI = Confidence Interval. Significant results are highlighted. # = inlay, plug. Non-tack fixation = suture, glue, clips, not specified.

**eTable 2.** Propensity Adjusted Multivariable Analysis of Risk Factors for Mesh-Related Complications

	Sample size, n	Crude events of complications, n	Multivariable analysis		
			HR	95% CI	p-value
<b>Sex</b>					
Male	1,352	67	1	(Reference)	
Female	1,524	75	1.09	(0.78-1.52)	0.61
<b>Age</b>					
18 – 50	729	27	1	(Reference)	
51 – 60	882	52	1.54	(0.97-2.46)	0.07
61 – 70	757	38	1.22	(0.74-2.01)	0.44
> 70	543	25	1.10	(0.64-1.90)	0.73
Mesh size, cm <sup>2</sup>	2,876	142	1.02	(1.01-1.02)	< 0.001
<b>Mesh type</b>					
PLL	620	38	1	(Reference)	
Coated PPL	966	45	0.90	(0.44-1.84)	0.77
PPL + ePTFE	847	42	0.89	(0.43-1.86)	0.76
ePTFE	127	6	0.80	(0.31-2.08)	0.65
Coated polyester	202	8	0.77	(0.30-1.20)	0.59
Other ^	114	3	0.43	(0.10-1.91)	0.27
<b>Mesh position</b>					
Sublay	305	17	1	(Reference)	
Onlay	427	24	1.24	(0.66-2.34)	0.50
Intraperitoneal	1917	95	2.10	(0.90-4.90)	0.86
Other #	91	6	1.51	(0.59-3.84)	0.39
<b>Mesh fixation</b>					
Tack	1817	82	1	(Reference)	
Non-tack	1059	60	1.20	(0.67-2.15)	0.54
<b>Operation type</b>					
Laparoscopic mesh	1,757	74	1	(Reference)	
Open mesh	1,119	68	2.36	(1.28-4.35)	0.01

All variables in the table are included in the multivariable analysis. n = number of patients. HR = Hazard ratio. CI = Confidence Interval. Significant results are highlighted. Mesh size increment = 10 cm<sup>3</sup>. PPL = polypropylene. ePTFE = expanded polytetrafluoroethylene. ^ = biologic (n = 4), completely absorbable synthetic (n = 3), not specified (n = 107). # = inlay, plug. Non-tack fixation = suture, glue, clips, not specified.

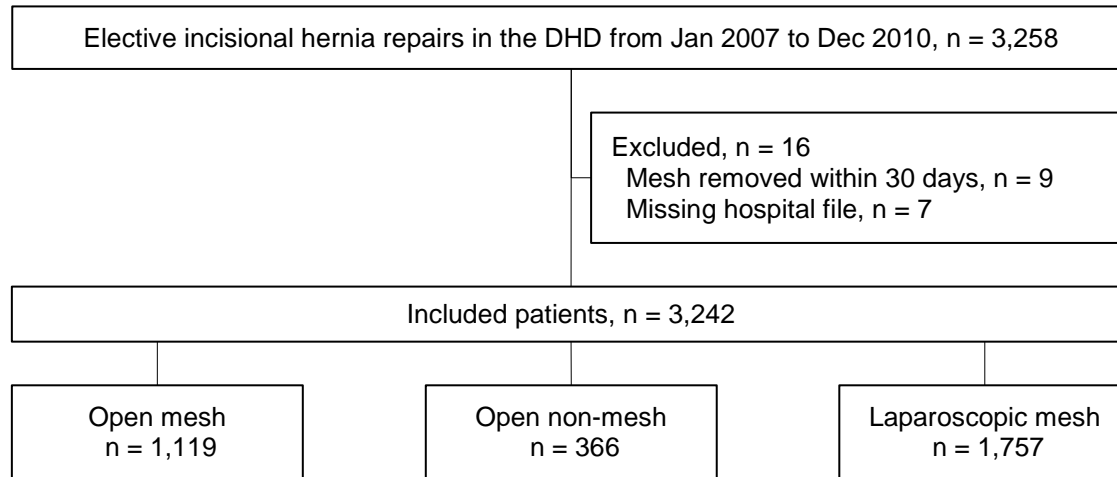
**eTable 3.** Bivariable and Multivariable Analysis of Risk Factors for Mesh-Related Complications

Open Mesh	Sample size, n	Crude events of complications, n	Bivariable analysis			Multivariable analysis		
			HR	95% CI	p-value	HR	95% CI	p-value
<b>Sex</b>								
Male	547	32	1	(Reference)		1	(Reference)	
Female	572	36	1.05	(0.66-1.70)	0.83	1.14	(0.70-1.85)	0.59
<b>Age</b>								
18 – 50	267	11	1	(Reference)		1	(Reference)	
51 – 60	324	27	2.08	(1.03-4.19)	0.04	1.81	(0.89-3.67)	0.10
61 – 70	301	17	1.38	(0.65-2.95)	0.41	1.28	(0.59-2.76)	0.54
> 70	227	13	1.45	(0.66-3.30)	0.34	1.34	(0.60-3.03)	0.48
Mesh size, cm <sup>2</sup>	1,119	68	1.02	(1.01-1.03)	< 0.001	1.02	(1.01-1.03)	<0.001
<b>Mesh type</b>								
PLL	597	37	1	(Reference)		1	(Reference)	
Coated PPL	123	2	0.27	(0.07-1.18)	0.71	1.20	(0.04-0.90)	0.04
PPL + ePTFE	230	21	1.52	(0.89-2.59)	0.13	1.12	(0.44-2.86)	0.81
ePTFE	48	4	1.37	(0.49-3.83)	0.67	1.30	(0.46-3.76)	0.62
Coated polyester	26	1	0.65	(0.89-4.71)	0.55	0.39	(0.49-3.16)	0.38
Other ^	94	3	3.56	(0.49-25.99)	0.21	0.84	(0.20-3.55)	0.81
<b>Mesh position</b>								
Sublay	322	17	1	(Reference)		1	(Reference)	
Onlay	451	24	1.00	(0.54-1.86)	1.00	1.26	(0.67-2.39)	0.47
Intraperitoneal	255	21	1.62	(0.86-3.07)	0.14	2.15	(0.80-5.78)	0.13
Other #	91	6	1.24	(0.49-3.14)	0.65	1.54	(0.60-3.93)	0.37
<b>Mesh fixation</b>								
Tack	142	12	1	(Reference)		1	(Reference)	
Non tack	977	56	1.84	(1.10-3.09)	0.02	0.86	(0.43-1.70)	0.67
<b>Laparoscopic Mesh</b>								
<b>Sex</b>								
Male	805	35	1	(Reference)		1	(Reference)	
Female	952	62	0.93	(0.59-1.47)	0.77	1.03	(0.65-1.63)	0.90
<b>Age</b>								
18 – 50	462	16	1	(Reference)		1	(Reference)	
51 – 60	498	25	1.43	(0.76-2.68)	0.27	1.31	(0.70-2.47)	0.40
61 – 70	456	21	1.39	(0.72-2.66)	0.33	1.24	(0.65-2.39)	0.51
> 70	341	12	1.08	(0.51-2.28)	0.85	0.94	(0.44-2.00)	0.87
Mesh size, cm <sup>2</sup>	1,757	74	1.01	(1.01-1.02)	<0.001	1.02	(1.01-1.02)	<0.001

Mesh type								
PPL	23	1	1	(Reference)		1	(Reference)	
Coated PPL	843	43	1.24	(0.17-8.97)	0.83	1.33	(0.18-9.67)	0.78
PPL + ePTFE	176	7	0.78	(0.11-5.82)	0.81	0.88	(0.12-6.56)	0.90
ePTFE	79	2	0.59	(0.05-6.48)	0.66	0.58	(0.05-6.38)	0.65
Coated polyester	617	21	0.96	(0.12-7.84)	0.96	1.11	(1.14-9.11)	0.92
Other ^	19	0	0.00	(0.00-1.14*10 <sup>149</sup> )	0.97	0.00	(0.00-5.50*10 <sup>192</sup> )	0.96
Mesh fixation								
Tack	1675	70	1	(Reference)		1	(Reference)	
Non-tack	82	4	1.27	(0.47-3.49)	0.64	0.80	(0.29-2.22)	0.67
Tack type								
Absorbable	241	10	1	(Reference)		1	(Reference)	
Non-absorbable	727	30	1.09	(0.53-2.23)	0.82	0.85	(0.41-1.78)	0.67

All variables in the table are included in the multivariable analyzes. n = number of patients. HR = Hazard ratio. CI = Confidence Interval. Significant results are highlighted. Mesh size increment = 10 cm<sup>2</sup>. PPL = polypropylene. ePTFE = expanded polytetrafluoroethylene. ^ = biologic (n = 4), completely absorbable synthetic (n = 3), not specified (n = 107). # = inlay, plug. Non-tack fixation = suture, glue, clips, not specified.

**eFigure.** Study Consort Diagram



DHD = Danish Hernia Database. n = number of patients.