

Nationwide Implementation of Robotic Minimally Invasive Surgery Increases Survival and Reduces Complications for Early Stage Endometrial Cancer

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Aim

To determine if a nationwide implementation of **robotic minimally invasive surgery (RMIS)** influenced survival and the risk of severe complications among women with early stage endometrial cancer.

Design

Nationwide prospective cohort study with long-term follow-up.

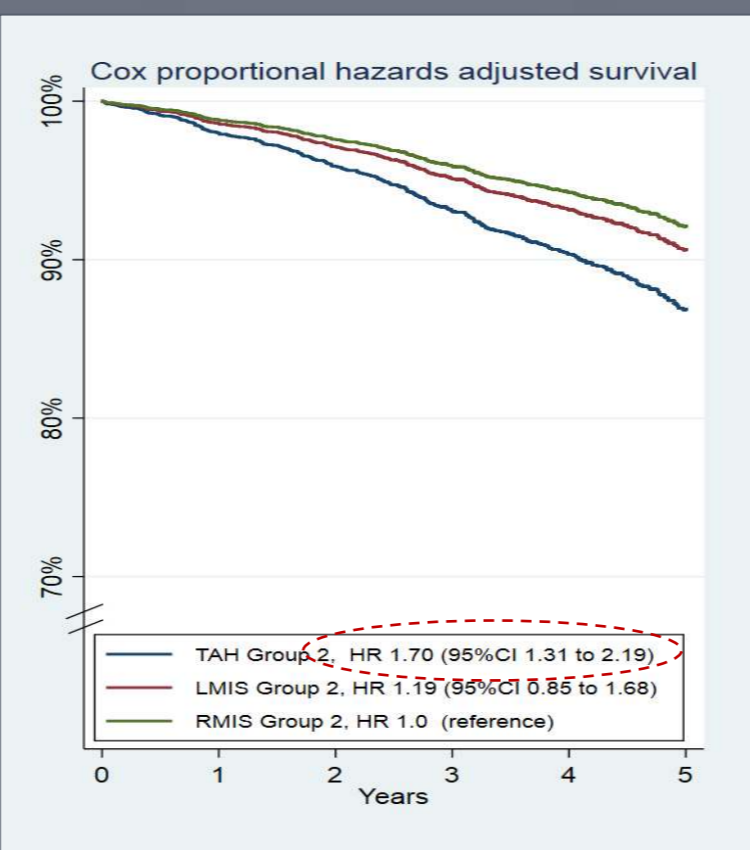
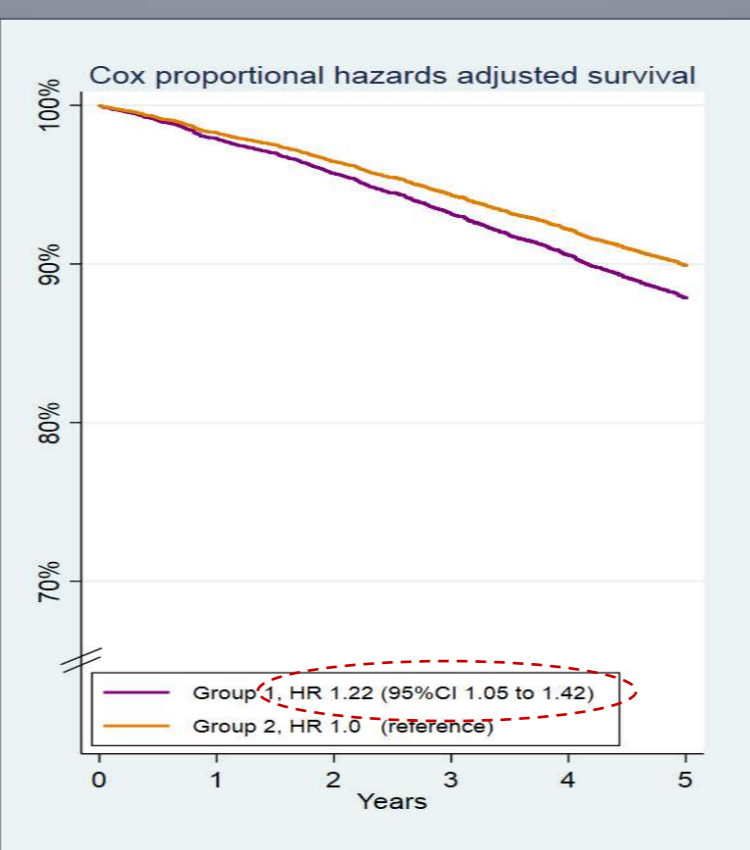
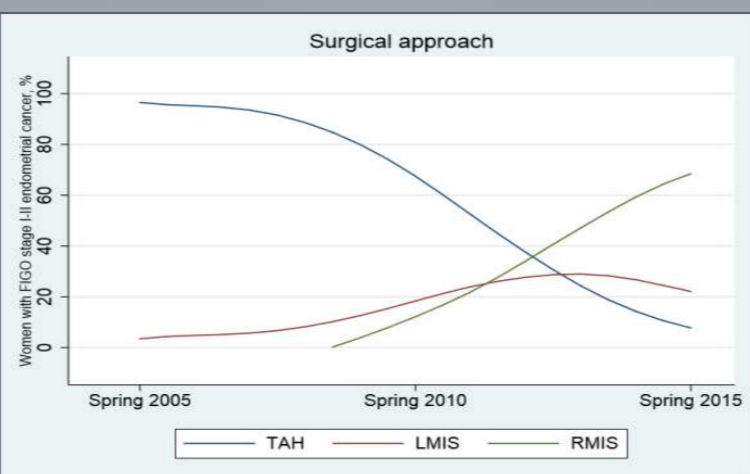
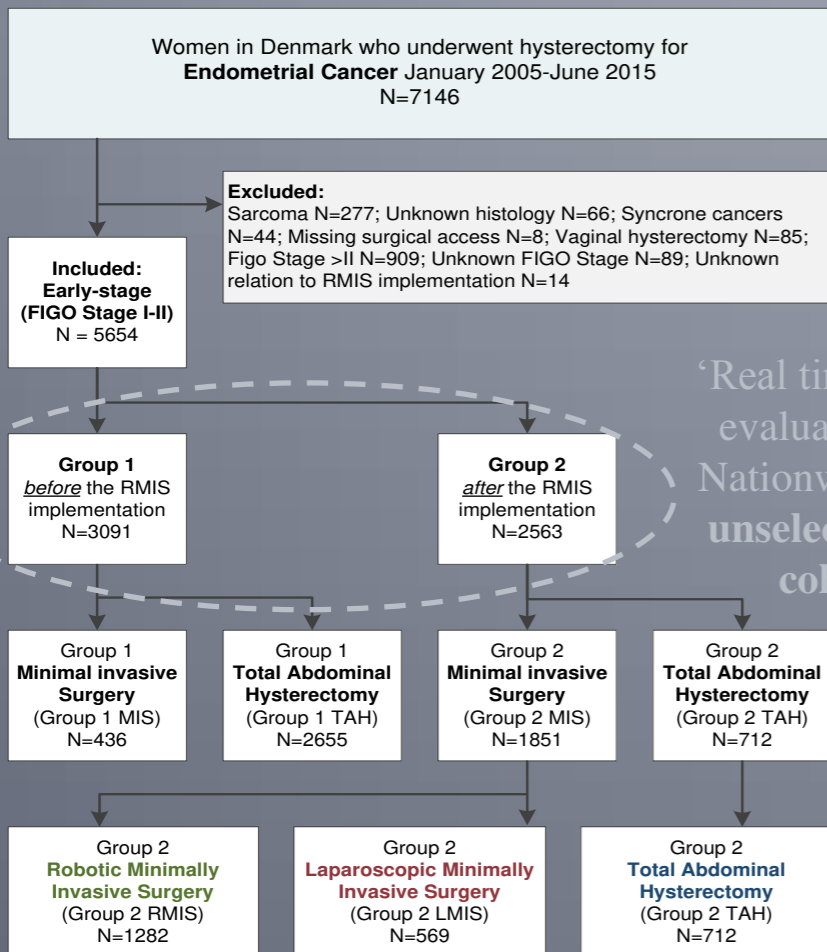
Conclusion

The Danish national introduction of robotic surgery was associated with a surgical paradigm shift towards minimally invasive surgery, which translated into increased survival and reduced risk of severe complications among women with early stage endometrial cancer.

Continued use of robotic minimally invasive surgery in early-stage endometrial cancer treatment is recommended.

Results

- Adjusted analyses demonstrated that women who underwent surgery before implementation RMIS were at higher risk of experiencing severe complications and held a lower survival than those who underwent surgery after.
- Among women who underwent surgery after implementation of RMIS, adjusted analyses demonstrated that those women who underwent open access surgery were at higher risk of severe complications and held a lower survival than those who underwent minimally invasive techniques.
- No significant differences were found between minimally invasive techniques regarding severe complications and 5-year survival.
- An explorative subanalysis of the overall survival demonstrated that the lower survival following open access surgery was primarily present among frail patients.



Material and methods

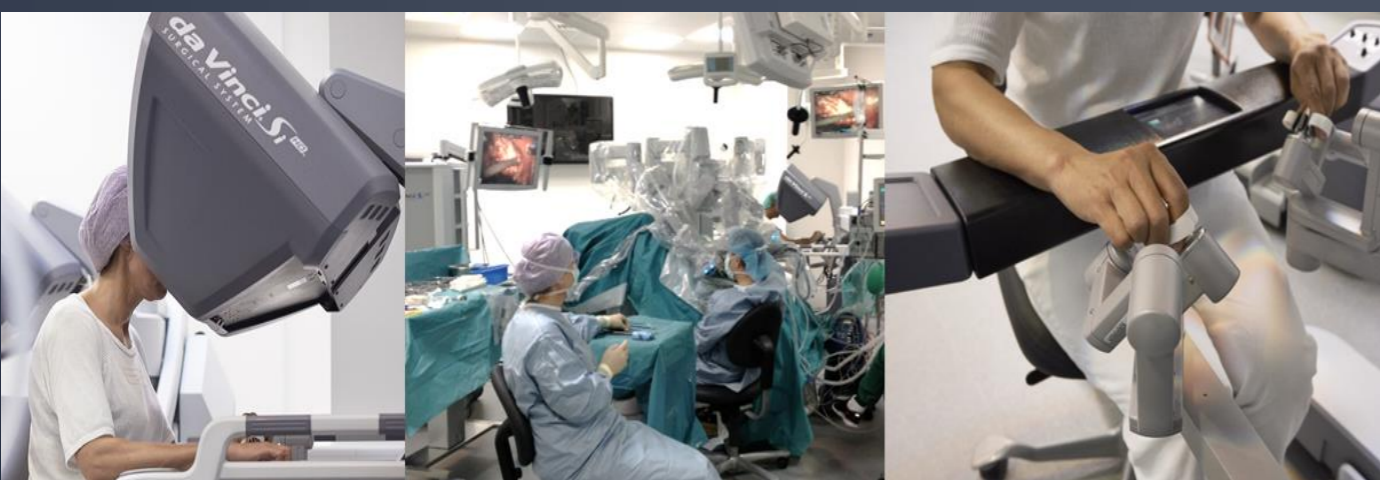
- The nationwide, validated Danish Gynecological Cancer Database was used.
- Data were merged with national registers for information on comorbidity, complications socioeconomic status and vital status.
- Each woman was individually allocated to Group 1 or 2, if she had surgery before or after the RMIS introduction in her county, respectively
- Surgical techniques were classified in TAH, LMIS and RMIS (see flowchart for abbreviations)
- Adjusted multiple regression models were used to compare severe complications while multivariate Cox-proportional hazards models stratified by histopathological risk were used to compare 5-year overall survival.
- Pre-specified potential covariates; age, BMI, CCI, ASA-score, smoking status, histopathological risk (Stage, Grade, and histological type), socio-economic class, lymphadenectomy and for complications also intraabdominal adhesions.

Severe complications included in the dichotomous variable	
Intraoperative complications	Unintended vascular damage Unintended urinary tract damage Unintended bowel damage Unintended nerve damage
Post-operative complications (90 days)	Acute renal failure Paralytic ileus Deep venous thrombosis Pulmonary embolism Acute myocardial infarction Sepsis Fistula Postoperative deep or intra-abdominal hematoma Surgical evacuation of cavities Need for gynecological reoperation
Death (30 days)	Death

	Severe complications	Multivariate logistic regression
Group 1, overall	7.3%	OR, 1.39 (95% CI 1.1-1.74)
Group 2, overall	6.2%	Reference
Group 2, TAH	11.4%	OR, 2.91 (95% CI 2.01-4.23)
Group 2, LMIS	5.1%	OR, 1.39 (95% CI 0.87-2.23)
Group 2, RMIS	3.9%	Reference

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Jørgensen SL et al., "Nationwide Introduction of Minimally Invasive Robotic Surgery for Early-Stage Endometrial Cancer and Its Association With Severe Complications" JAMA Surg. Doi:10.1001/jamasurg. 2018.5840. Jørgensen SL et al., "Survival after a nationwide introduction of robotic surgery in women with early-stage endometrial cancer: a population-based prospective cohort study" Doi.org/10.1016/j.ejca.2018.12.004.



Adjusted and stratified Cox proportional hazards models of 'non-frail' and 'frail' women with early-stage endometrial cancer.				
Subgroup	Number of deaths/total ^d	Group 2 ^b		
		TAH Group 2 ^b	LMIS Group 2 ^b	RMIS Group 2 ^b
		HR (95% CI)	HR (95% CI)	HR (95% CI)
'Non-frail' women	125/1887	1.31 (0.90-1.90)		1.00 (reference)
'Frail' women ^c	622/2961	1.23 (1.04-1.45)		1.00 (reference)
Subgroup	Number of deaths/total	TAH Group 2 ^b	LMIS Group 2 ^b	RMIS Group 2 ^b
		HR (95% CI)	HR (95% CI)	HR (95% CI)
'Non-frail' women	44/909	1.58 (0.78-3.20)	1.84 (0.83-4.09)	1.00 (reference)
'Frail' women ^c	254/1362	1.65 (1.25-2.19)	1.10 (0.75-1.60)	1.00 (reference)

Abbreviation: CI, confidence interval.
^a Patients with missing values are not included.
^b Group 1, women who had surgery before RMIS introduction.
^c Group 2, women who had surgery after RMIS introduction.
^d Frailty is defined by advanced age (≥ 80 years), ASA score III, or higher, low/intermediate-low socioeconomic class, CCI II or higher.