

Implementation of Robotic Surgery in a Rural Setting: Impact on Need for Assistant Surgeon and Route of Hysterectomy

Alexandra N McQuillen¹, Natasha R Alligood-Perocco, MD², Angela D Huggler, MD²

(1)Philadelphia College of Osteopathic Medicine, Philadelphia, PA (2)Gynecology, University of Pittsburgh Medical Center, Williamsport, PA

INTRODUCTION

The benefits of minimally-invasive hysterectomy are well established and include reduced pain, reduced infection risk, shorter hospitalization and postoperative recovery times.¹ Robot-assisted hysterectomy and laparoscopic hysterectomy are considered equivalent in terms of clinical outcomes,²⁻⁹ however robot-assisted hysterectomy allows the surgeon improved visualization, range of motion, and ergonomics which in some cases may obviate the need for an assistant surgeon.¹⁰ In rural hospitals where physician shortages remain a major barrier to care,¹¹⁻¹² reducing the number of surgeons necessary to perform hysterectomy would be of significant consequence.

The socioeconomic and structural barriers to healthcare facing rural residents are well documented, and result in poorer health outcomes.^{11-12, 13-16} Ensuring access to minimally-invasive gynecologic surgery in a rural setting is key in the provision of timely, quality gynecologic care.

HYPOTHESIS: Implementation of robotic surgery at a single-site rural hospital would reduce the need for assistant surgeon presence at the time of hysterectomy and increase the percentage of hysterectomies completed via minimally invasive technique.

METHODS

- Retrospective chart review of hysterectomies performed at a rural community hospital by general gynecologists, focusing on the 12-month period prior to, and the 12-month period 2 years following, implementation of a robotic surgical program.
- We chose 2 years to allow for gradual surgeon adoption of robotic technology.
- During the comparison years there was minimal physician turnover consisting of a single retirement (Surgeon A).
- Our primary outcome was need for an assistant surgeon at time of hysterectomy. Our secondary outcome was route of hysterectomy.
- We classified laparoscopic, robotic, and vaginal hysterectomy as "minimally invasive" for the purposes of this study.
- Billing records were cross-referenced against the medical record.
- Changes were compared using chi-squared analysis. The study was provided exempt status by the University of Pittsburgh Institutional Review Board.

RESULTS & DISCUSSION

- Following implementation of a robotic surgical program, we observed a statistically significant decrease in the need for an assistant surgeon at the time of hysterectomy from 86.7% to 29.7% ($p < 0.05$).
- The percentage of hysterectomies performed via minimally-invasive technique (laparoscopic, robotic, and vaginal) versus open technique (total abdominal) increased from 67.0% to 87.4% following implementation of a robotic surgical program ($p < 0.05$).

Table 1. Surgeons and mode of hysterectomy, pre-implementation of robotics

	Abdominal	Laparoscopic	Robotic	Vaginal	TOTAL
Surgeon A	5	0	0	0	5
Surgeon B	25	3	0	4	32
Surgeon C	0	49	0	5	54
Surgeon D	16	1	0	3	20
Surgeon E	9	0	0	7	16
Surgeon F	6	13	0	7	26
Surgeon G	1	33	0	1	35
TOTAL	62	99	0	27	188

Table 2. Surgeons and mode of hysterectomy, 2 years post-implementation of robotics

	Abdominal	Laparoscopic	Robotic	Vaginal	TOTAL
Surgeon A	0	0	0	0	0
Surgeon B	5	3	20	3	31
Surgeon C	1	1	52	5	59
Surgeon D	15	6	0	6	27
Surgeon E	6	8	10	12	36
Surgeon F	2	0	47	1	50
Surgeon G	1	0	35	0	36
TOTAL	30	18	164	27	239

Table 3. TAH* and MIGS** hysterectomies, pre-implementation of robotics

	TOTAL TAH	TOTAL MIGS
#	62	126
%	32.978723	67.0212766

Table 4. TAH* and MIGS** hysterectomies, 2 years post-implementation of robotics

	TOTAL TAH	TOTAL MIGS
#	30	209
%	12.5523013	87.44769874

Table 5. Assistant surgeon, pre-implementation of robotics

Assistant?	Abdominal	Laparoscopic	Robotic	Vaginal	TOTAL	%
YES	43	98	0	22	163	86.70
NO	19	1	0	5	25	13.29
TOTAL	62	99	0	27	188	

Table 6. Assistant surgeon, 2 years post-implementation of robotics

Assistant?	Abdominal	Laparoscopic	Robotic	Vaginal	TOTAL	%
YES	27	16	5	23	71	29.70
NO	3	2	159	4	168	70.29
TOTAL	30	18	164	27	239	

*Total abdominal hysterectomy
**Minimally Invasive Gynecologic Surgery

CONCLUSION

Access to robotic surgical technology reduced the need for an assistant surgeon at time of hysterectomy and increased the rate of minimally-invasive hysterectomy performed. These findings are of particular relevance to rural hospitals facing physician shortages.

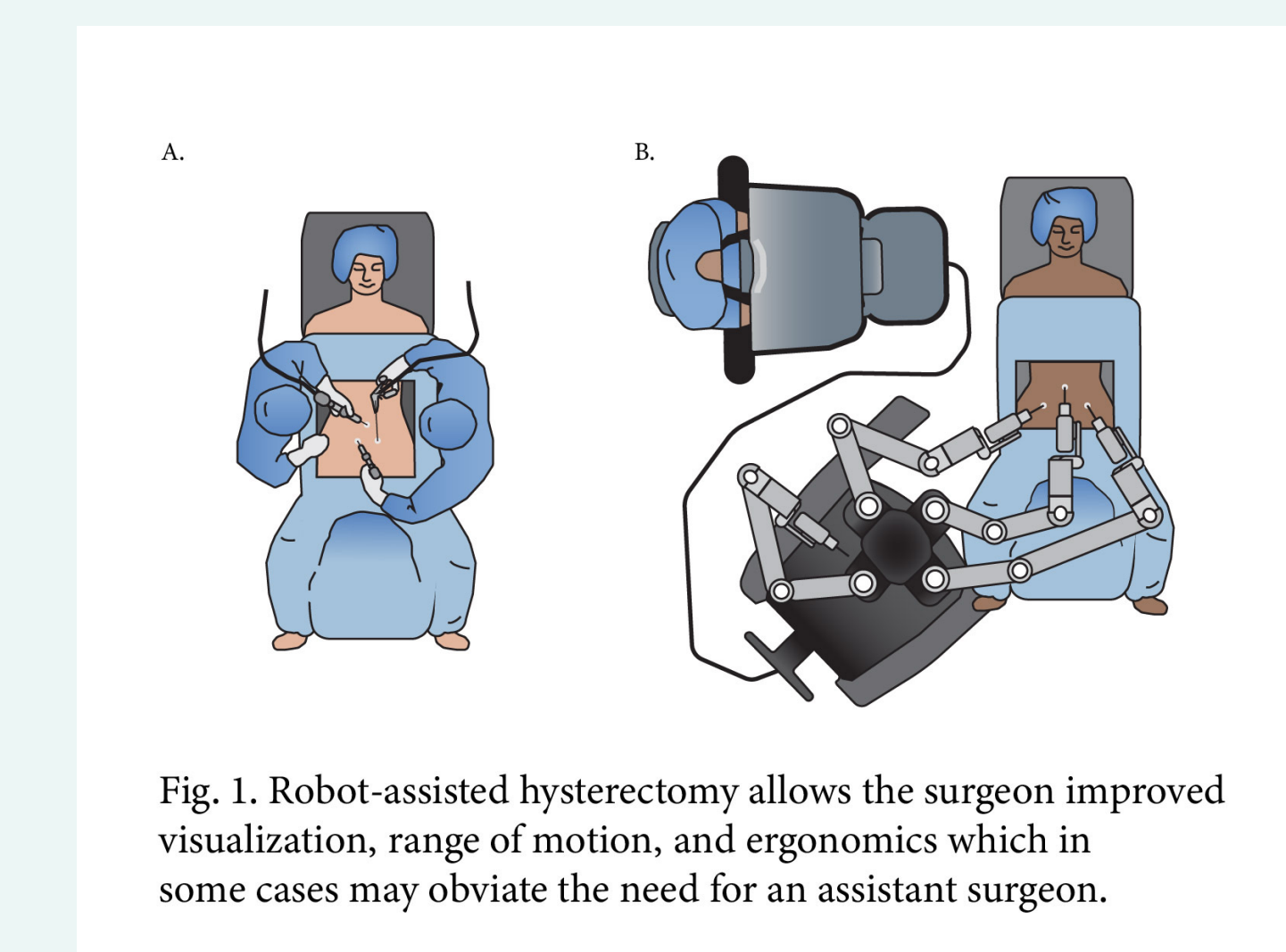
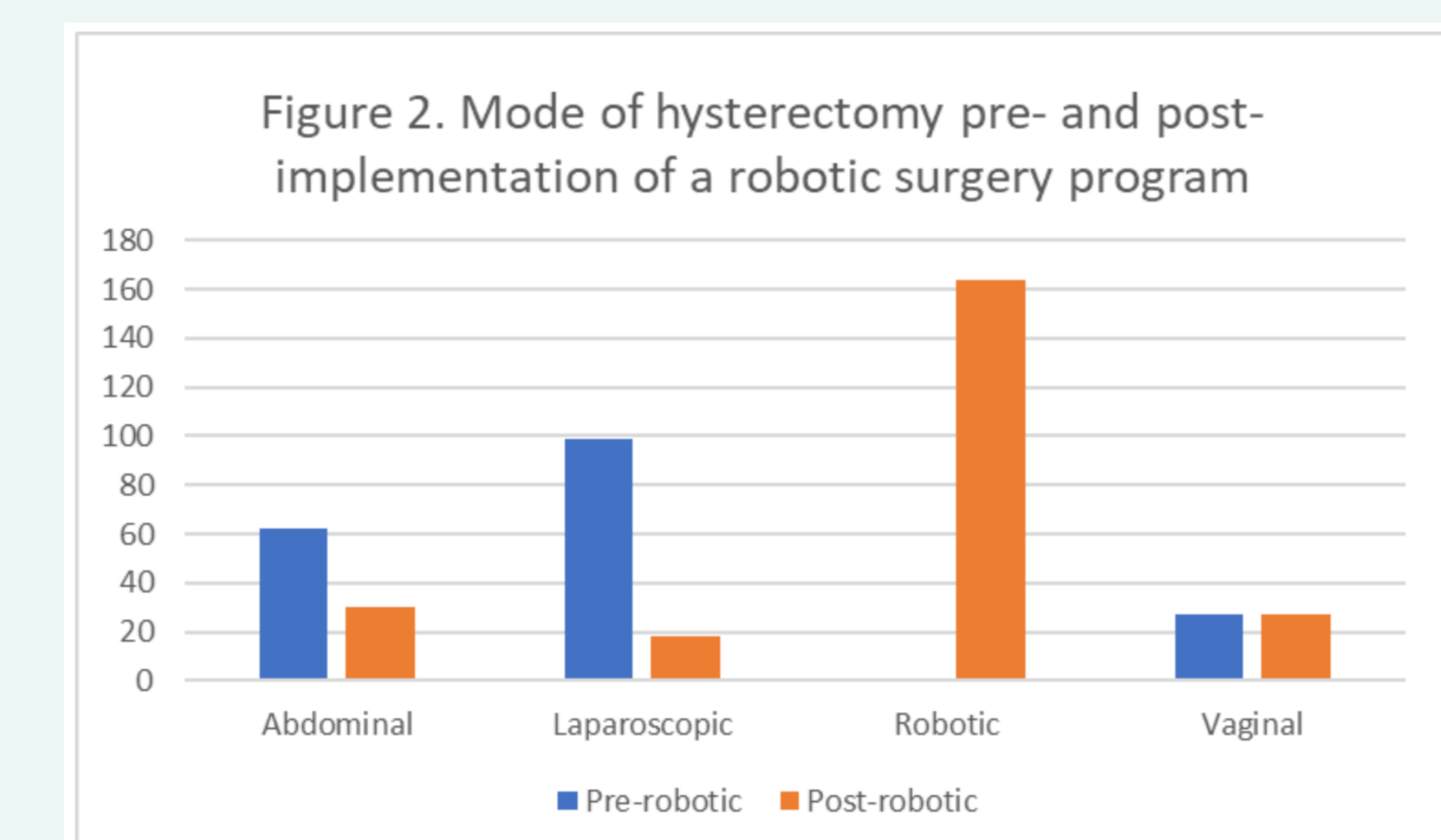


Fig. 1. Robot-assisted hysterectomy allows the surgeon improved visualization, range of motion, and ergonomics which in some cases may obviate the need for an assistant surgeon.

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