Robotic Surgery's Economic Edge In A Safety Net Hospital: Direct Cost Analysis

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Background

The adoption of robotic-assisted surgery has seen a surge over the past decade, driven by its promise for greater surgical precision and potentially improved patient outcomes. However, since the inception of robotic-assisted surgery, its cost-effectiveness remains a subject of debate. This study aims to compare the direct costs of robotic-assisted and laparoscopic approaches in hernia and bariatric surgeries. By doing so, it seeks to clarify the economic viability of robotic surgery.

Methods

We conducted a comprehensive cost analysis by comparing the direct costs of laparoscopic and robotic-assisted surgical procedures, specifically focusing on hernia and bariatric surgeries. Procedures included laparoscopic Gastric Sleeve vs. Robotic Gastric Sleeve, Laparoscopic Roux-en-Y Gastric Bypass (RYGB) vs. Robotic Roux-en-Y Gastric Bypass (RYGB), Laparoscopic Totally Extraperitoneal (TEP) Inguinal Hernia Repair vs. Robotic Transabdominal Preperitoneal (TAPP) Inguinal Hernia Repair, Laparoscopic Intraperitoneal Onlay Mesh (IPOM) Hernia Repair vs. Robotic IPOM Hernia Repair, and Laparoscopic IPOM Hernia Repair vs. Robotic Preperitoneal Ventral Hernia Repair.

Results

Laparoscopic Sleeve

Instruments	Cost Each	Quantity	Total Cost
Endoscopic Scissors	$44.28	1	$44.28
Ligasure	$625.55	1	$625.55
Echelon 60 Stapler	$402.53	1	$402.53
60 Black Reloads	$191.68	1	$191.68
60 Green Reloads	$191.68	4	$766.72
Trocars - 12mm	$26.70	2	$125.00
Trocars - 5m	$26.70	3	$125.00
SeamGuard	$191.68	5	$958.40
Total Disposable Lap Cost			**$3,239.16**

VS

Robotic Sleeve

Instruments	Cost Each	Quantity	Total Cost
Vessel Sealer Extend	$625	1	$625
Cadiere	$150	2	$300
SureForm 60 Stapler	$530	1	$530
Sureform Reloads (Blue & White)	$230	5	$1,150
Robotic Arm Drapes	$52	4	$208
Robotic Column Drape	$18	1	$18
Robotic 5-8mm Seals	$18	3	$54
Robotic 12mm Seal	$20	1	$20
Robotic Reducer	$25	1	$25
Total Robotic Cost			**$2,930**

Robotic Sleeve Cost Savings

$309.16

Laparoscopic RYGB

Instruments	Cost Each	Quantity	Total Cost
Monopolar Hook	$120	1	$120
Cadiere Forceps	$150	2	$300
Mega Suture Cut Needle Driver	$170	1	$170
Vessel Sealer Extend	$625	1	$625
SureForm 60 Stapler	$530	1	$530
Sureform Reloads (Blue & White)	$230	7	$1,610
Robotic Arm Drapes	$52	4	$208
Robotic Column Drape	$18	1	$18
Robotic 5-8mm Seals	$18	3	$54
Robotic 12mm Seal	$20	1	$20
Robotic Reducer	$25	1	$25
Total Robotic Cost			**$3,680**

VS

Robotic RYGB

Instruments	Cost Each	Quantity	Total Cost
Endoscopic Scissors	$44.28	1	$44.28
Endocatch Bag	$243.19	2	$486.38
Ligasure	$625.55	1	$625.55
Harmonic	$579.73	1	$579.73
EEA Circular Stapler	$1,650.00	1	$1,650.00
EEA Anvil	$376.31	1	$376.31
Echelon 45 Stapler	$335.44	1	$335.44
Echelon 60 Stapler	$402.53	1	$402.53
45 White Reloads	$177.27	2	$354.54
45 Blue Reloads	$177.27	1	$177.27
60 White Reloads	$191.68	3	$575.04
60 Blue Reloads	$191.68	3	$575.04
Trocars - 12mm	$26.70	4	$106.80
Trocars - 5m	$26.70	1	$26.70
Total Disposable Lap Cost			**$6,315.61**

Robotic Bypass Cost Savings:

$2,635.61

Laparoscopic IPOM

Instruments	Total Cost
Trocars	$112
Absorbable Tacker	$769.09
Coated Mesh 15cm	$600
Total Disposable Lap Cost	**$1,481.09**

VS

Robotic Preperitoneal

Instruments	Total Cost
Monopolar Scissor + Tip Cover	$340
Prograsp	$150
Mega Suture Cut Needle Driver	$175
Robotic Arm Drapes	$210
Robotic Column Drape	$18
Cannula Seals	$54
Uncoated Mesh	$54
Total Robotic Cost	**$1,001**

Robotic Cost Savings: **$480.09**

Laparoscopic IPOM

Instruments	Total Cost
Trocars	$112
Absorbable Tacker	$769.09
Coated Mesh 15cm	$600
Total Disposable Lap Cost	**$1,481.09**

VS

Robotic IPOM

Instruments	Total Cost
Monopolar Scissor + Tip Cover	$340
Prograsp	$150
Mega Suture Cut Needle Driver	$175
Robotic Arm Drapes	$210
Robotic Column Drape	$18
Cannula Seals	$54
Uncoated Mesh	$600
Total Robotic Cost	**$1,547**

Robotic Cost Savings: $-65.91

Laparoscopic TEP

Instruments	Total Cost
Kidney Balloon Dissector	$475.18
Balloon Trocar	$294.37
Absorbable Tacker	$769.09
Lap Scissor Tip	$37.638
Total Disposable Lap Cost	**$1,576.28**

VS

Robotic TAPP

Instruments	Total Cost
Monopolar Scissor + Tip Cover	$340
Prograsp	$150
Mega Suture Cut Needle Driver	$175
Robotic Arm Drapes	$210
Robotic Column Drapes	$18
Cannula Seals	$54
Total Robotic Cost	**$947**

Robotic Inguinal Cost Savings: **$629.28**

Conclusions

Our study unveils a paradigm shift in surgical economics. Robotic-assisted surgery demonstrates substantial direct cost savings compared to laparoscopic procedures Our findings challenge the notion that robotic surgery is inherently more expensive and runs counter to existing literature. This study highlights cost-effective aspects of robotic surgery which is particularly important in a safety net hospital where resource allocation is paramount. We hope this research contributes to informed decision-making and encourages further exploration of robotic surgery's role in achieving both financial efficiency and improved patient outcomes.