AirSeal® Clinical Publications & Summary Statements

General Surgery

Summary Statements:

1. 4 General Surgery studies found that operating at a lower IAP with AirSeal® resulted in a clinically significant reduction in both OR time and length of stay for procedures including lap choles, hernia repairs, and gastric bypasses. [16, 17, 21, 28]

2. In 5 General Surgery studies, Airseal®'s outcome-driven technology has been proven to reduce cost of care for patients by allowing surgeons to safely operate at a lower IAP, which reduces post-op pain and leads to a shorter length of stay. [1, 16,17, 21, 28]

Author	Journal	Publication Type	Focus of Study	Study Design	# of Subjects	Key Metrics	Key Findings
N de'Angelis, Brunetti	Surgical Endoscopy	Consecutive, Prospective	Lap Cholecystectomy	AirSeal® at 8 mmHg vs. SI at 12mmHg	35 patients	Post-op morbidity, Return to baseline	1. Low stable pneumoperitoneum pressure with AirSeal® in sickle cell disease (SCD) patients is associated with a significantly reduced incidence of post-operative SCD-related morbidity 2. AirSeal® allowed for rapid ambulation/return to regular diet without increasing the total cost per patient
Needleman	SAGES publication	Retrospective, Randomized	Roux-en-Y (Gastric Bypass)	AirSeal® 10mm trocar vs. VersaStep 12mm trocar	200 patients (100 with 10mm AirSeal® trocar vs. 100 with 12mm VersaStep trocar)	Operative time, Blood loss, Hemodynamic values, End-tidal CO2	The AirSeal® group: 1. Saved 12.3 minutes on average, which saves about $345 per case on OR time 2. Had a mean EBL of 34.6cc compared to the VersaStep group which had a mean EBL of 45cc

Ramshaw	Surgical Technology International XXIX	CQI	Lap ventral hernia	AirSeal® at 8-10mmHg with Exparel vs. SI at 15mmHg with and without Exparel	120 patients (53 with SI at 15mmHg, 37 with SI at 15mmHg + Exparel, 30 with AirSeal® at 8-10mmHg + Exparel)	Length of PACU and hospital stay, Procedure time	1. Patients in AirSeal® + Exparel group had a shorter length of stay in hospital 2. Procedures in AirSeal® + Exparel group were 25% shorter in duration (101 minutes vs. 135 minutes)
Ramshaw	Surgical Endoscopy	CQI Process Improvement	Lap Inguinal Hernia	SI at 15mmHg vs. AirSeal® at LP with Exparel	93 patients (35 with AirSeal® at LP and Exparel, 59 with SI at standard pressure without Exparel)	Pain, Same day discharge	Patients in the group with AirSeal® at low pressure and Exparel: 1. Were 7.81 times more likely to be discharged on the day of surgery 2. Were 80.5% less likely to develop a new type of groin pain after surgery
Richards	The American Surgeon	Consecutive, Prospective	Lap general & Bariatric surgery	AirSeal® at 8-12mmHg vs. SI at 15mmHg	83 patients (41 with AirSeal®, 42 with SI)	Post-op pain, Anesthesia metrics	AirSeal® group showed: 1. Trends toward lower pain scores at discharge or 24 hours 2. Statistically lower PIP (peak inspiratory pressure) 3. Statistically lower etCO2
Telem	SAGES publication	CQI	Lap Cholecystectomy	AirSeal® at 10mmHg vs. SI at 10mmHg	51 patients (26 AirSeal®, 25 SI)	Length of stay	1. Patients in the AirSeal® group had a LOS that was 34.7% shorter (19.6 vs 30 hours) than patients in the SI group

Urology

Summary Statements:

1. In 9 Urology studies, over 2,000 patients experienced a shorter procedure time due to AirSeal®'s ability to maintain a stable, clear working space at a lower intra-abdominal pressure, even with continuous suction or large leaks. [22, 23, 24, 25, 27, 29, 32, 35, 38]

2. AirSeal® has reduced the cost of care for over 4,000 patients across 17 Urology studies. Our unique technology allows surgeons to safely operate at lower intra-abdominal pressures which improves procedural efficiency, reduces post-operative pain, and leads to a shorter hospital stay when compared to conventional insufflation. [4, 6, 7, 13, 15, 18, 20, 22, 23, 24, 25, 26, 27, 29, 32, 35, 38]

3. Almost 2,000 patients across 5 Urology studies experienced a shorter length of stay when surgeons utilized AirSeal® at an intra-abdominal pressure lower than 15mmHg. [15, 22, 23, 24, 35]

Author	Journal	Publication Type	Focus of Study	Study Design	# of Subjects	Key Metrics	Key Findings
Abaza	Journal of Urology	Consecutive, Retrospective	Robotic Prostatectomy	Factors associated with same day discharge (AirSeal® at 6mmHg)	500 patients	Day of discharge	1. Patient charges were significantly lower for patients that were discharged on the day of surgery with no increase in readmissions or emergency visits
Abaza, Ferroni	Journal of Urology	Randomized, Double-blinded, Controlled trial	Robotic Prostatectomy	AirSeal® at 6mmHg vs. AirSeal® at 15mmHg	138 patients (67 at 6mmHg, 71 at 15mmHg)	Pain scores, Ventilatory metrics	The 6mmHg group showed: 1. Significantly lower post-op pain scores 2. Improved ventilation - reduced etCO2 & PIP, reduced MAP
Abaza, Ferroni	British Journal of Urology International	Prospective, Consecutive	Robotic Prostatectomy	AirSeal® at 6mmHg vs. AirSeal® at 15mmHg	600 patients (300 AirSeal® at 6mmHg, 300 AirSeal® at 15mmHg)	Procedure time, EBL, Post-op pain, LOS, Complications, 30-day readmission	The 6mmHg group showed: 1. Patients had lower max pain scores between 5 and 12 hours 2. Fewer overall complications 3. The mean LOS was shorter (0.57 vs 1 day) 4. 43.3% of patients were discharged on the day of surgery 5. Fewer patients returned to the ER within 30 days 6. Fewer patients were readmitted within 30 days

Annino	Surgical Endoscopy	Prospective, Consecutive	Robotic Partial Nephrectomy	AirSeal® vs. SI at 12-15mmHg	122 patients (67 AirSeal® at 12-15mmHg, 55 SI at 12-15mmHg)	Procedure time, Warm ischemia time	The AirSeal® group showed: 1. Procedures were 10.8% shorter in duration 2. Warm ischemia time was 38.9% shorter 3. A significant increase in the number of cases performed as "zero ischemia" (clampless) was observed in the AirSeal® group (20 vs 4 cases)
Covotta	Anesthesia & Analgesia	Prospective, Parallel	Robotic Cystectomy	AirSeal® vs. SI at 10-14mmHg	56 patients (28 AirSeal® at 12mmHg, 28 SI at 12mmHg)	Ventilation, Hemodynamic metrics	Patients in the AirSeal® group showed: 1. Lower inspiratory plateau pressure (Pplat) 2. Lower minute volume (MV) 3. Lower etCO2 4. Significantly higher static compliance (Cstat)
Desroches	Urology (The Gold Journal)	Prospective, Randomized, Multi-center	Robotic Partial Nephrectomy	AirSeal® at 12mmHg vs. AirSeal® at 15mmHg vs. SI at 15mmHg	202 patients (66 AirSeal® at 12mmHg, 69 AirSeal® at 15mmHg, 66 SI at 15mmHg)	Insufflation-related complications, Ventilation metrics, LOS	1. Patients in the 12mmHg AirSeal® group developed subcutaneous emphysema less often than patients in both the AirSeal® 15mmHg and SI 15mmHg groups 2. Peak airway pressure was lower in both AirSeal® groups vs. the SI group 3. etCO2 was lower in the AirSeal® 12mmHg group vs. both the AirSeal® 15mmHg and SI 15mmHg groups
El-Hajj, Ayoub	World Journal of Urology	Single-tertiary center study	Robotic Prostatectomy	AirSeal® at 10mmHg vs. SI at 12mmHg	326 Patients (125 AirSeal®, 201 SI)	Perioperative outcomes, Post-op complications	AirSeal® was associated with: 1. Shorter operative times by 12.3 minutes 2. Shorter length of hospital stay by 0.5 days 3. Lower odds of Clavien-Dindo complications
Fan	Journal of Robotic Surgery	Systematic, Meta-analysis	Robotic Partial Nephrectomy	AirSeal® vs. SI	379 patients (194 AirSeal®, 185 SI)	SCE, Post-op pain scores	AirSeal® group showed: 1. Significantly lower rates of subcutaneous emphysema 2. 12hr post-operative pain scores significantly lower
Feng, Porter	Journal of Urology	Prospective Randomized Controlled trial	Partial Nephrectomy	AirSeal® at 12mmHg, AirSeal® at 15mmHg, and SI at 15mmHg	93 patients (31 AirSeal® at 12mmHg, 31 AirSeal® at 15mmHg, 31 SI at 15mmHg)	SCE, Pain, LOS, Recovery time	1. AirSeal® insufflation at 12mmHg was associated with a reduced risk of developing subcutaneous emphysema 2. Pain was decreased in both AirSeal® groups compared to standard insufflation

Forte, Sorrenti	Frontiers in Surgery	Retrospective	Lap Partial Nephrectomy	AirSeal® vs. SI at 12mmHg	27 patients (14 AirSeal® vs. 13 SI)	Mean operative time, Blood loss, Ischemia time, Complications (SCE, PT, PM)	AirSeal® group showed: 1. Lower operative time (107.5 min in AirSeal® group vs. 120 min in SI group) 2. Lower complication rates 3. Decreased perioperative blood loss (1.45g/dL vs 2.2g/dL) 4. Reduced warm ischemia time (18 min vs. 20 min)
Kavoussi, Wimhofer	World Journal of Urology	Single-site, Retrospective	Robotic Prostatectomy	AirSeal® at 10mmHg vs. SI at 12mmHg	642 Patients (257 AirSeal®, 385 SI)	Procedure time	1. Mean operative time decreased by 23.2 min in AirSeal® group vs. SI group
Landman	Urology (the Gold Journal)	Prospective, Randomized	Laparoscopic Renal & Peri-Renal Surgery	AirSeal® at 15mmHg vs. SI at 15mmHg	56 Patients (28 AirSeal® at 12mmHg, 28 SI at 12mmHg)	Pressure variability, Physiological effects	Patients in the AirSeal® group: 1. Had a pneumoperitoneum that was far more stable or less variable than patients in the Standard Insufflation group 2. Had a lower etC02 after 10 minutes of insufflation than patients in the SI group
Lee	Society of Laparoscopic and Robotic Surgeons	Consecutive, Prospective	Robotic Prostatectomy	AirSeal® at 15mmHg vs. SI at 15mmHg	200 Patients (100 AirSeal® at 15mmHg, 100 SI at 15mmHg)	Procedure time, Post-op pain, N/V, LOS, Complication rate	1. Procedures in the AirSeal® group were 12.6% shorter in duration 2. Patients in AirSeal® group had fewer episodes of nausea (2% vs 10%) 3. Trend towards less pain in the AirSeal® group within the first 24 hours after surgery
Lu, Zou	International Journal of Surgery	Meta-analysis	Minimally invasive Urological surgery	AirSeal® (VIS) vs. Standard (CIS) at various pressures	13 studies, 1875 patients (836 VIS, 1039 CIS)	Peri-operative outcomes	AirSeal® resulted in: 1. Significantly lower Clavien-Dindo III-IV complications 2. Significantly reduced general and shoulder pain at 12-24h post-op 3. Reduced LOS
Mottrie, Vandenbr-oucke	Clinical Genitourinary Cancer	Prospective, single center	Robot-assisted radical prostatectomy (RARP)	AirSeal® at 8mmHg	53 patients at 8mmHg	Central venous pressure (CVP), Mean airway pressure	1. Central venous pressure and mean airway pressure showed improvements when AirSeal® was used

Badani	Journal of Laparoendosc-opic & Advanced Surgical Techniques	Meta-analysis	Robotic Urologic surgery	AirSeal® vs. SI at various pressures	10 studies, 1,765 patients	PAP, Minute volume, etCO2, Static compliance, Complication rates, Operating time	The AirSeal® group showed: 1. Lower inspiratory plateau pressure, lower minute volume, lower ETCO2, lower C02 elimination rate, higher static compliance 2. Improved cardiopulmonary parameters 3. Some studies showed decreased complication rates at low pressure
Rohloff, Maatman	Journal of Robotic Surgery	Prospective, randomized, Double blinded trial	Robotic Prostatectomy	AirSeal® at 12mmHg vs. AirSeal® at 15mmHg	407 patients (198 AirSeal® at 12mmHg, 209 AirSeal® at 15mmHg)	LOS, Post-op ileus	Patients in the AirSeal® at 12mmHg group: 1. Had a significantly shorter LOS 2. Showed lower occurrence of post-operative ileus (decreased from 12% to 5%)
Xu	World Journal of Urology	Randomized Controlled Trial	Robotic Partial Nephrectomy	AirSeal® at 12mmHg vs. SI at 15mmHg	62 patients (31 AirSeal®, 31 SI)	Rate of subcutaneous emphysema (SCE)	AirSeal® group showed: 1. Significantly lower subcutaneous emphysema rate than the conventional group 2. Significantly lower etCO2, PaCO2 at the end of the operation, lower tidal volumes and frequency of scope cleaning 3. Significantly lower post-op pain scores at 8hr, 12hr and at time of discharge
Yezdani	The Journal of Urology	Single-site, Perspective	Robotic Prostatectomy	AirSeal® vs. 12mm standard Versaport	149 patients (70 with AirSeal®, 79 with SI)	Operative time, EBL, LOS, Pain scores	AirSeal® group showed: 1. Significantly less operative time (146min vs. 167min) 2. Reduction in intraoperative blood loss (132ml vs. 215ml) 3. Pain scores at 6-12 hours post-op were significantly lower (3.3 vs. 4.1) than the SI group
Zhi, Wang	Journal of Robotic Surgery	Meta-analysis	Robot-assisted Radical Prostatectomy	AirSeal® vs. SI at various pressures	1503 patients (657 AirSeal®, 846 SI)	Peri-operative outcomes	1. AirSeal® results in shorter operative time, reduced hospital stays and fewer major complications

Vasdev	BJUI	Prospective, consecutive	Robot-assisted Radical Cystectomy	AirSeal® at 15mmHg vs. AirSeal® at 12mmHg	20 patients (10 AirSeal® at 15mmHg, 10 AirSeal® at 12mmHg)	Flatus/stools, Ileus rates	The 12mmHg AirSeal® group: 1. Had a 40 min shorter operative time and 1-day shorter LOS than the 15mmHg group 2. Had fewer patients with ileus (10% vs. 30%) compared to the 15mmHg group 3. Passed flatus 1 day earlier and stooled 1.5 days earlier than 15mmHg group 4. The study found that patients in the 15mmHg AirSeal® group had a higher risk of paralytic ileus post robotic cystectomy and robotic intracorporeal urinary diversion
Siddiqui	Journal of Robotic Surgery	Systematic review, Meta-analysis	Partial Nephrectomy	AirSeal® at 12mmHg vs. Standard at 15mmHg	5 studies, 427 patients (220 AirSeal®, 207 Standard)	etCO2	1. AirSeal® significantly lowers etCO2 in patients undergoing LPN, which can therefore impact recovery and complication rates

Gynecology

Summary Statements:

1. 3 Gynecology studies with over 600 patients demonstrate AirSeal®'s ability to improve patient outcomes through advanced insufflation technology. It enables surgeons to operate safely at a lower IAP, resulting in improved ventilatory metrics and reduced post-op pain, all which contribute to a shorter LOS. [9, 10, 12]

2. Over 600 patients across 3 Gynecology studies have experienced an overall reduction in cost of care with AirSeal® due to its ability to maintain clear visualization and a stable low pneumoperitoneum pressure during adverse intraoperative conditions (such as colpotomy). When compared to conventional insufflation, these features drive cost savings by promoting procedural efficiency and reducing post-operative pain and length of stay. [9, 10, 12,]

3. Operating with AirSeal® at low IAP resulted in a clinically relevant reduction in post-operative pain for over 600 patients across 3 Gynecology studies. This is due to its valve-free technology and ability to maintain a stable pneumoperitoneum compared to conventional insufflators. [9, 10, 12]

Author	Journal	Publication Type	Focus of Study	Study Design	# of Subjects	Key Metrics	Key Findings
Benifla	Journal of Gynecology Obstetrics and Human Reproduction	Prospective, Randomized	Laparoscopic Gynecology	AirSeal® at 7mmHg vs. SI at 15mmHg	60 patients (30 AirSeal®, 30 SI)	Post-op pain, Ventilation metrics, LOS	Patients in the AirSeal® group: 1. Experienced both a lower incidence and severity of post-operative pain 2. Had lower maximal peak airway pressure 3. Had lower maximal etCO2 4. Had a lower maximal systolic blood pressure 5. Twice as many patients in the AirSeal® group were discharged on the day of surgery (46.7% vs. 23.3%)

Huang	Journal of Robotic Surgery	Prospective, Consecutive	Robotic Gynecology	AirSeal® at 8, 10, & 12mmHg vs. SI at 15mmHg	598 patients (99 SI at 15mmHg, 100 AirSeal® at 12mmHg, 99 AirSeal® at 10mmHg, 300 AirSeal® at 8mmHg)	Post-op pain, LOS, Ventilation metrics	1. Each reduction in intraabdominal pressure corresponded to a significant decrease in initial pain scores and LOS 2. Patients in the AirSeal® 8 & 10mmHg groups had significantly shorter lengths of stay compared to the high-pressure groups (12 & 15mmHg) 3. Each reduction in intraabdominal pressure corresponded to a significant decrease in Peak Inspiratory Pressures (PIP) 4. Each reduction in intraabdominal pressure corresponded to a significant decrease in Tidal Volume (TV)
Buda	Journal of Healthcare	Multicenter, Retrospective	Laparoscopic Hysterectomy, BSO, Sentinel Node Biopsy	AirSeal® at 8-10mmHg vs. SI at 12-14mmHg	152 patients (84 AirSeal®, 68 SI)	Ventilation metrics, Post-op pain, LOS	AirSeal® patients showed: 1. Lower incidence of post-operative shoulder pain 2. Lower severity of global pain at 4, 8, and 24 hours 3. Significantly lower etCO2 4. Significantly lower Peak Airway Pressure 5. Significantly lower systolic blood pressure 6. Significantly faster recovery 7. 98% of patients were discharged within 2 days vs. 75% of patients in the standard group
Boualaoui	Clinics in Surgery	Retrospective, single-center	Lap/Robotic Sacrocolpopexy	AirSeal® vs. Standard Insufflation	34 patients (17 AirSeal® at 7mmHg vs. 17 Standard Insufflation at 12mmHg)	Operating time, LOS, Post-op pain	The AirSeal® group showed: 1. A statistically significant difference in the mean operating time (110 minutes in the AirSeal® group vs. 121 minutes in the Standard Insufflation group) 2. Trend towards shorter LOS 3. Trend towards lower post-op pain

Colorectal Surgery

Summary Statements:

1. There are over 100 patients across 3 colorectal studies that suggest when AirSeal® is used at low pressure, patients experience a reduction in post-op pain, post-op ileus rates and procedural time, all which contribute to a shorter hospital stay. [14, 19, 37]

2. Due to the stable pneumoperitoneum that AirSeal®'s valve-free technology can provide, Colorectal surgeons across 2 studies with over 100 patients experienced a reduction in both operative time and patient length of stay. [14, 37]

3. A retrospective Colorectal study shows that utilizing AirSeal® at 12mmHg or lower reduces the length of time that patients are NPO after TaTME procedures. [19]

Author	Journal	Publication Type	Focus of Study	Study Design	# of Subjects	Key Metrics	Key Findings
Denost	British Journal of Surgery	Prospective, Randomized	Laparoscopic & Robotic Colectomy	AirSeal® at 7mmHg vs. AirSeal® at 12mmHg	127 patients (62 AirSeal® at 7mmHg, 65 AirSeal® at 12 mmHg)	LOS, Post-op pain, Post-op morbidity	AirSeal® at 7mmHg group experienced: 1. Reduced LOS (1 day) 2. Lower post-operative pain scores 3. Improved post-operative patient mobilization (sitting and walking)
Grieco	Updates in Surgery	Consecutive, Retrospective	TaTME	AirSeal® at 12mmHg vs. AirSeal® at 15mmHg	74 patients (53 AirSeal® at 12mmHg, 21 AirSeal® at 15mmHg)	Ileus rates	The low pressure group showed: 1. Decreased occurrence of post-op ileus 2. Shorter time to solid oral feeding

Obias	Journal of Robotic Surgery	Retrospective	Robotic LAR and Right Hemicolectomy	AirSeal® at 15mmHg vs. SI at 15mmHg	150 Patients (54 LAR & 32 Right Hemicolectomy with SI, 40 LAR & 24 Right Hemicolectomy with AirSeal®)	Procedure time, EBL	AirSeal® group showed: 1. Significantly shorter (20.8%) Low Anterior Resection procedure times (232 min vs. 293 min) 2. Significantly lower EBL (28.2%) in Low Anterior Resection procedures (150cc vs. 209cc)
Akingboye	Langenbeck's Archives of Surgery	Prospective	Laparoscopic Colorectal surgery	AirSeal® at 8mmHg vs. SI at 15mmHg	120 patients (53 at 8 mmHg, 67 at 15 mmHg)	Ventilatory metrics, Pain, Passing flatus	AirSeal® at 8mmHg group experienced: 1. Improved intraoperative lung compliance and peak inspiratory pressures 2. Decreased post-op pain over 5 days both at rest and on exertion 3. Low IAP was associated with an earlier time to pass flatus post-op

Multi-specialty

Summary Statements:

1. Over 2,000 AirSeal® patients across 18 studies experienced a reduction in post-op pain in PACU when AirSeal® was used at low pressure intra-operatively. [1, 2, 4, 7, 9, 10, 12, 14, 15, 16, 17, 18, 21, 22, 26, 27, 35, 38]

2. With the utilization of AirSeal®, over 2,000 patients across four surgical specialties have experienced a shorter operative time. This is due to AirSeal®'s ability to provide a stable pneumoperitoneum that improves intra-operative visibility. [16, 22, 23, 24, 25, 27, 28, 29, 32, 35, 37, 38]

3. Close to 3,000 patients experienced a shorter length of stay after surgery due to the low-pressure benefits of AirSeal®'s proprietary valve-free technology. These benefits include a stable working environment for consistent visibility, a reduction in post-op pain, and a lower risk of insufflation-related complications when compared to standard insufflators. [9, 10, 12, 14, 15, 16, 17, 20, 21, 22, 23, 24, 35]

4. Compared to conventional insufflation, AirSeal® remains on the forefront of cutting-edge surgical technology evidenced by its favorable patient outcomes which include improved intra-operative ventilatory metrics, reduced post-op pain, reduced length of stay and readmission rates, and a decreased risk for developing insufflation-related complications. [1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 32, 34 35, 38]

Pediatric

Author	Journal	Publication Type	Focus of Study	Study Design	# of Subjects	Key Metrics	Key Findings
Miyano	Asian Journal of Endoscopic Surgery	Single subject case study	Laparoscopic Toupet Fundoplication	AirSeal® used in procedure	1 patient	Stability, Procedure completion	1. With the AirSeal® iFS, there was no disruptive loss of pneumoperitoneum, which saves time and allows the operator to focus without distraction 2. The AirSeal® iFS contributed to the successful completion of LTF in a 1.8kg infant

Miscellaneous

Author	Journal	Publication Type	Focus of Study	Study Design	# of Subjects	Key Metrics	Key Findings
Katoh	Indian Journal of Otolaryngology and Head & Neck Surgery	Retrospective	Total endoscopic hemithyroid -ectomy	AirSeal® at 6mmHg vs. Conventional insufflation at 8mmHg	20 patients (11 AirSeal® at 6mmHg, 9 Conventional at 8mmHg)	Scope cleaning, SCE, AirSeal® capabilities	1. The AirSeal® system significantly reduced the frequency of scope cleaning (p=0.016) 2. Time to disappearance of subcutaneous emphysema around the surgical cavity was significantly shorter in the AirSeal® group (p=0.019) 3. When suctioning mist/smokes produced by an energy device, AirSeal® prevented narrowing in the working space and greatly contributed to wide and clear visibility

ConMed

References:

[1] Saway JP, McCaul M, Mulekar MS, McMahon DP, Richards WO. Review of Outcomes of Low Verses Standard Pressure Pneumoperitoneum in Laparoscopic Surgery. Am Surg. 2022;88(8):1832-1837. doi:10.1177/00031348221084956

[2] Abaza R, Ferroni MC. Randomized Trial of Ultralow vs Standard Pneumoperitoneum during Robotic Prostatectomy. J Urol. 2022;208(3):626-632. doi:10.1097/JU.0000000000002729

[3] Covotta M, Claroni C, Torregiani G, et al. A Prospective, Randomized, Clinical Trial on the Effects of a Valveless Trocar on Respiratory Mechanics During Robotic Radical Cystectomy: A Pilot Study. Anesth Analg. 2017;124(6):1794-1801. doi:10.1213/ANE.0000000000002027.

[4] Desroches B, Porter J, Bhayani S, Figenshau R, Liu PY, Stifelman M. Comparison of the Safety and Efficacy of Valveless and Standard Insufflation During Robotic Partial Nephrectomy: A Prospective, Randomized, Multi-institutional Trial. Urology. 2021;153:185-191. doi:10.1016/j.urology.2021.01.047

[5] Bucur P, Hofmann M, Menhadji A, et al. Comparison of Pneumoperitoneum Stability Between a Valveless Trocar System and Conventional Insufflation: A Prospective Randomized Trial. Urology. 2016;94:274-280. doi:10.1016/j.urology.2016.04.022

[6] Razdan S, Ucpinar B, Okhawere KE, Badani KK. The Role of AirSeal® in Robotic Urologic Surgery: A Systematic Review. J Laparoendosc Adv Surg Tech. 2023;33(1). doi:10.1089/lap.2022.0153

[7] Wei M, Yang W, Zhou J, et al. Comparison of AirSeal® versus conventional insufflation system for retroperitoneal robot-assisted laparoscopic partial nephrectomy: a randomized controlled trial. World J Urol. 2024;42(1):90. Published 2024 Feb 21. doi:10.1007/s00345-024-04819-3

[8] Faizan M, Shariq K, Abbas FS, Murtaza DA, Naveed A, Tarar HM, Fahim R, Kumar S, Siddiqui SA. A comparison of CO2-related complications in partial nephrectomies between the AirSeal® system and conventional system: a systematic review and meta-analysis. J Robot Surg. 2025;19:104. doi:10.1007/s11701-025-02227-2

[9] Sroussi J, Elies A, Rigouzzo A, et al. Low pressure gynecological laparoscopy (7mmHg) with AirSeal® System versus a standard insufflation (15mmHg): A pilot study in 60 patients. J Gynecol Obstet Hum Reprod. 2017;46(2):155-158. doi:10.1016/j.jogoh.2016.09.003

[10] Buda A, Di Martino G, Borghese M, et al. Low-Pressure Laparoscopy Using the AirSeal® System versus Standard Insufflation in Early-Stage Endometrial Cancer: A Multicenter, Retrospective Study (ARIEL Study). Healthcare (Basel). 2022;10(3):531. Published 2022 Mar 14. doi:10.3390/healthcare10030531

[11] Hamid, M., Zaman, S., Mostafa, O.E.S. et al. Low vs. conventional intra-abdominal pressure in laparoscopic colorectal surgery: a prospective cohort study. Langenbecks Arch Surg 410, 12 (2024). https://doi.org/10.1007/s00423-024-03579-3

[12] Foley CE, Ryan E, Huang JQ. Less is more: clinical impact of decreasing pneumoperitoneum pressures during robotic surgery. J Robot Surg. 2021;15(2):299-307. doi:10.1007/s11701-020-01104-4

[13] Abaza R, Martinez O, Ferroni MC, Bsatee A, Gerhard RS. Same Day Discharge after Robotic Radical Prostatectomy. J Urol. 2019;202(5):959-963. doi:10.1097/JU.0000000000000353

[14] Celarier S, Monziols S, Célérier B, et al. Low-pressure versus standard pressure laparoscopic colorectal surgery (PAROS trial): a phase III randomized controlled trial. Br J Surg. 2021;108(8):998-1005. doi:10.1093/bjs/znab069

[15] Ferroni MC, Abaza R. Feasibility of robot-assisted prostatectomy performed at ultra-low pneumoperitoneum pressure of 6 mmHg and comparison of clinical outcomes vs standard pressure of 15 mmHg. BJU Int. 2019;124(2):308-313. doi:10.1111/bju.14682

[16] Ramshaw B, Forman B, Heidel E, Dean J, Gamenthaler A, Fabian M. A Clinical Quality Improvement (CQI) Project to Improve Pain After Laparoscopic Ventral Hernia Repair. Surg Technol Int. 2016;29:125-130.

[17] Ramshaw B, Vetrano V, Jagadish M, Forman B, Heidel E, Mancini M. Laparoscopic approach for the treatment of chronic groin pain after inguinal hernia repair : Laparoscopic approach for inguinodynia. Surg Endosc. 2017;31(12):5267-5274. doi:10.1007/s00464-017-5600-3

[18] Feng TS, Heulitt G, Islam A, Porter JR. Comparison of valve-less and standard insufflation on pneumoperitoneum-related complications in robotic partial nephrectomy: a prospective randomized trial. J Robot Surg. 2021;15(3):381-388. doi:10.1007/s11701-020- 01117-z 2.

[19] Grieco, M., Tirelli, F., Agnes, A., Santocchi, P., Biondi, A., & Persiani, R. (2021). High-pressure CO2 insufflation is a risk factor for postoperative ileus in patients undergoing TaTME. Updates

in surgery, 73(6), 2181–2187. https://doi.org/10.1007/s13304-021-01043-1

[20] Rohloff M, Cicic A, Christensen C, Maatman TK, Lindberg J, Maatman TJ. Reduction in postoperative ileus rates utilizing lower pressure pneumoperitoneum in robotic-assisted radical prostatectomy. J Robot Surg. 2019;13(5):671-674. doi:10.1007/s11701-018-00915-w

[21] Kikhia, R. M., Price, K., Alli, V., Pryor, A., Gracia, G., Rubano, J., Schnur, J., & Telem, D. (2017). Prospective evaluation of low insufflation pressure cholecystectomy using an insufflation management system versus standard CO2 pneumoperitoneum. SAGES Annual Meeting Abstracts Archive.

[22] Ayoub CH, Armache AK, El-Asmar JM, et al. The impact of AirSeal® on complications and pain management during robotic-assisted radical prostatectomy: a single-tertiary center study. World J Urol. 2023;41(10):2685-2692. doi:10.1007/s00345-023-04573-y

[23] Zhi W, Wang Y, Wang L, Yang L. Comparative assessment of safety and efficacy between the AirSeal® system and conventional insufflation system in robot-assisted laparoscopic radical prostatectomy: a systematic review and meta-analysis. J Robot Surg. 2024;18(1):291. Published 2024 Jul 23. doi:10.1007/s11701-024-02000-x

[24] Vasdev N, Martin N, Hackney AB, Piedad J, Hampson A, Shan G-M, et al. Comparing different pneumoperitoneum (12 vs. 15 mmHg) pressures with cytokine analysis to evaluate clinical outcomes in patients undergoing robotic-assisted laparoscopic radical cystectomy and intracorporeal robotic urinary diversion. BJUI Compass. 2023; 4(5): 575–583. https://doi.org/10.1002/bco2.240

[25] George, A. K., Wimhofer, R., Viola, K. V., Pernegger, M., Costamoling, W., Kavoussi, L. R., & Loidl, W. (2015). Utilization of a novel valveless trocar system during robotic-assisted laparoscopic prostatectomy. World journal of urology, 33(11), 1695–1699. https://doi.org/10.1007/s00345-015-1521-8

[26] Fan G, Chen Y, Wang J, et al. Comparison of AirSeal® versus conventional insufflation system for robot-assisted partial nephrectomy: a meta-analysis and systematic review. *J Robot Surg*. 2024;18(1):269. Published 2024 Jun 26. doi:10.1007/s11701-024-02023-4

[27] Yezdani, M., Yu, S.-J., Lee, A., Taylor, B., McGill, A., Monahan, K., & Lee, D. (2016). MP23-17 Improved Outcomes During Robotic Prostatectomy Utilizing AirSeal® Technology. Journal of Urology, 195(4S), e268. https://doi.org/10.1016/j.juro.2016.02.739 (Original work published April 1, 2016)

[28] Rydlewicz, J. A., Suzo, A. J., Mikami, D. J., & Needleman, B. J. (2025). Retrospective study of the AirSeal™ system for laparoscopic bariatric surgery. Journal of Minimally Invasive Surgery, 32(2), 123-130. The Ohio State University Wexner Medical Center. https://doi.org/10.1007/s00464-025-01234-5[1]

[29] Annino, F., Topazio, L., Autieri, D., Verdacchi, T., De Angelis, M., & Asimakopoulos, A. D. (2017). Robotic partial nephrectomy performed with Airseal® versus a standard CO2 pressure pneumoperitoneum insufflator: a prospective comparative study. Surgical endoscopy, 31(4), 1583–1590. https://doi.org/10.1007/s00464-016-5144-y

[30] Boualaoui, I., Bey, E., De Villeneuve, M. H., Dergamoun, H., Droupy, S., & Wagner, L. Medico-Economic Impact of the AirSeal® Insufflator: Example of Laparoscopic Sacrocolpopexy. Clin Surg. 2021; 6, 3084.

[31] de'Angelis, N., Abdalla, S., Carra, M. C., Lizzi, V., Martínez-Pérez, A., Habibi, A., Bartolucci, P., Galactéros, F., Laurent, A., & Brunetti, F. (2018). Low-impact laparoscopic cholecystectomy is associated with decreased postoperative morbidity in patients with sickle cell disease. Surgical endoscopy, 32(5), 2300–2311. https://doi.org/10.1007/s00464-017-5925-y

[32] Forte, F., Tripodi, D., Pironi, D., Corongiu, E., Gagliardi, F., Frisenda, M., Gallo, G., Quarantiello, A., Di Lorenzo, G., Cavaleri, Y., Salciccia, S., Lori, E., & Sorrenti, S. (2023). Comparison of laparoscopic partial nephrectomy performed with AirSeal® system vs. standard insufflator: results from a referral center. Frontiers in surgery, 10, 1220332. https://doi.org/10.3389/fsurg.2023.1220332

[33] Katoh, H., Ikeda, Y., Saito, Y. et al. The Usefulness of AirSeal™ Intelligent Flow System in Gas Insufflation Total Endoscopic Thyroidectomy. Indian J Otolaryngol Head Neck Surg 75, 115–120 (2023). https://doi.org/10.1007/s12070-022-03257-0

[34] La Falce, S., Novara, G., Gandaglia, G., Umari, P., De Naeyer, G., D'Hondt, F., Beresian, J., Carette, R., Penicka, M., Mo, Y., Vandenbroucke, G., & Mottrie, A. (2017). Low Pressure Robot-assisted Radical Prostatectomy With the AirSeal® System at OLV Hospital: Results From a Prospective Study. Clinical genitourinary cancer, 15(6), e1029–e1037. https://doi.org/10.1016/j.clgc.2017.05.027

[35] Lu, Y., Zou, Q., Jiang, B., & Li, Q. (2024). Perioperative outcomes and safety of valveless insufflation system in minimally invasive urological surgery: a systematic review and meta-analysis. International journal of surgery (London, England), 110(9), 5763–5770. https://doi.org/10.1097/JS9.0000000000001634

[36] Miyano, G., Morita, K., Kaneshiro, M., Miyake, H., Nouso, H., Yamoto, M., Koyama, M., Nakano, R., Tanaka, Y., Fukumoto, K., & Urushihara, N. (2015). Laparoscopic Toupet Fundoplication using an Air Seal Intelligent Flow System and Anchor Port in a 1.8-kg infant: A Technical Report. Asian journal of endoscopic surgery, 8(3), 357–360. https://doi.org/10.1111/ases.12182

[37] Paull, J. O., Parsacandola, S. A., Graham, A., Hota, S., Pudalov, N., & Obias, V. (2021). The impact of the AirSeal® valve-less trocar system in robotic colorectal surgery: a single-surgeon retrospective review. Journal of robotic surgery, 15(1), 87–92. https://doi.org/10.1007/s11701-020-01071-w

[38] Shahait, M., Cockrell, R., Yezdani, M., Yu, S. J., Lee, A., McWilliams, K., & Lee, D. I. (2019). Improved Outcomes Utilizing a Valveless-Trocar System during Robot-assisted Radical Prostatecomy Prostatectomy (RARP). JSLS : Journal of the Society of Laparoendoscopic Surgeons, 23(1), e2018.00085. https://doi.org/10.4293/JSLS.2018.00085