



Closure of the Open Abdomen Using the Abdominal Reapproximation Anchor System®

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Background

- Despite advances in the understanding and management of the open abdomen, 15% or more of patients may not have fascial closures prior to discharge.¹
- The Abdominal Reapproximation Anchor System® (ABRA) is a wound closure device available from Canica Design (Almonte, Ontario, Canada).
- Urbaniak et al. - Ann Plast Surg: 2006²
 - post-traumatic open abdomen after 21 days
 - Fascia closed with ABRA in place 21 days
- Reimer et al. - Can J Surg: 2008³
 - 23 pts w/ open abdomens
 - 61% primary closure rate overall
 - 6 Hernias and 2 ECF
 - Widely varied technique/prototype devices

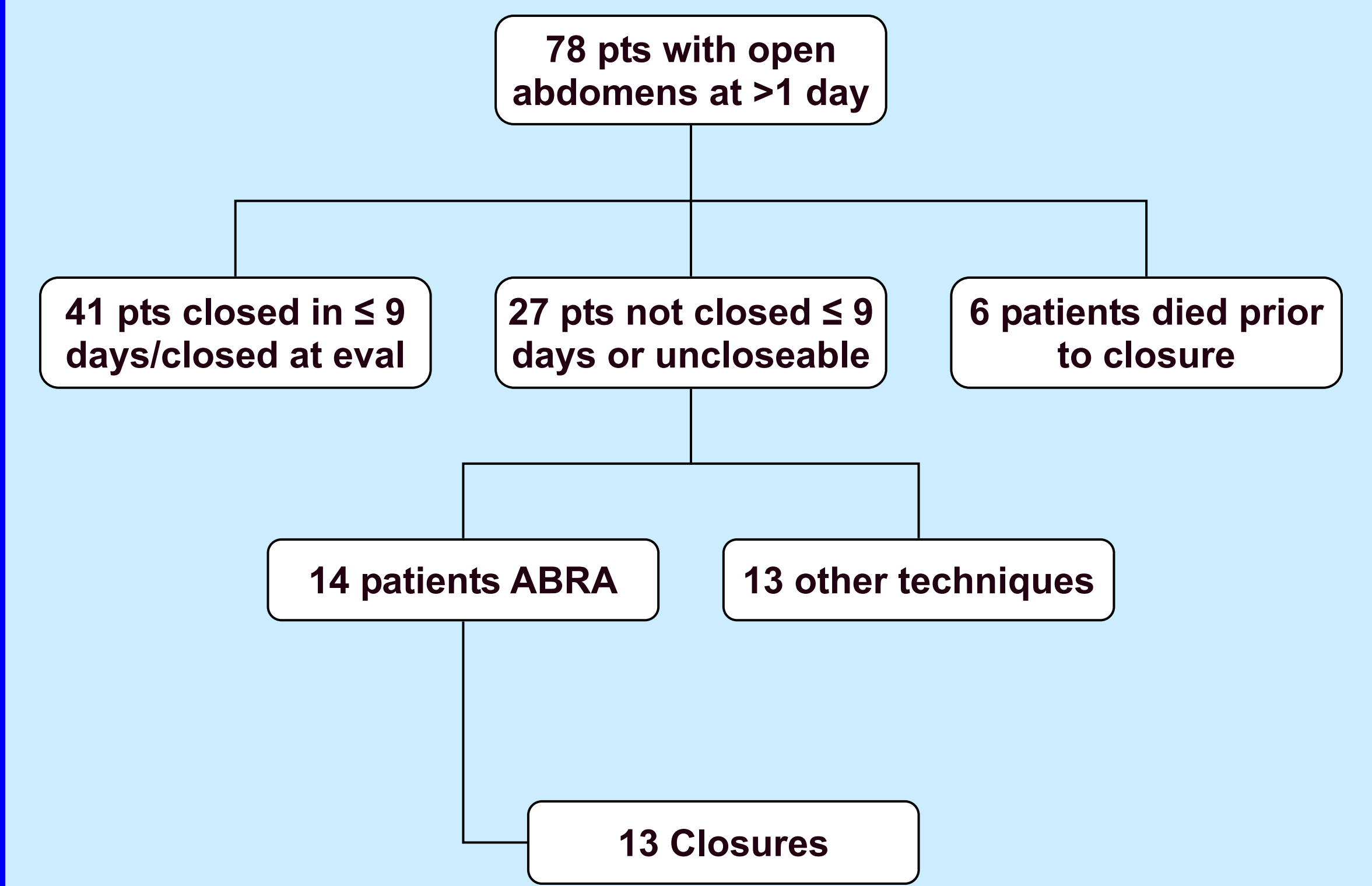
Aims

- The goal of this study is to report our experience with the ABRA.
- Improved results utilizing a standardized application technique.



Before: fascial defect = 22cmx27cm

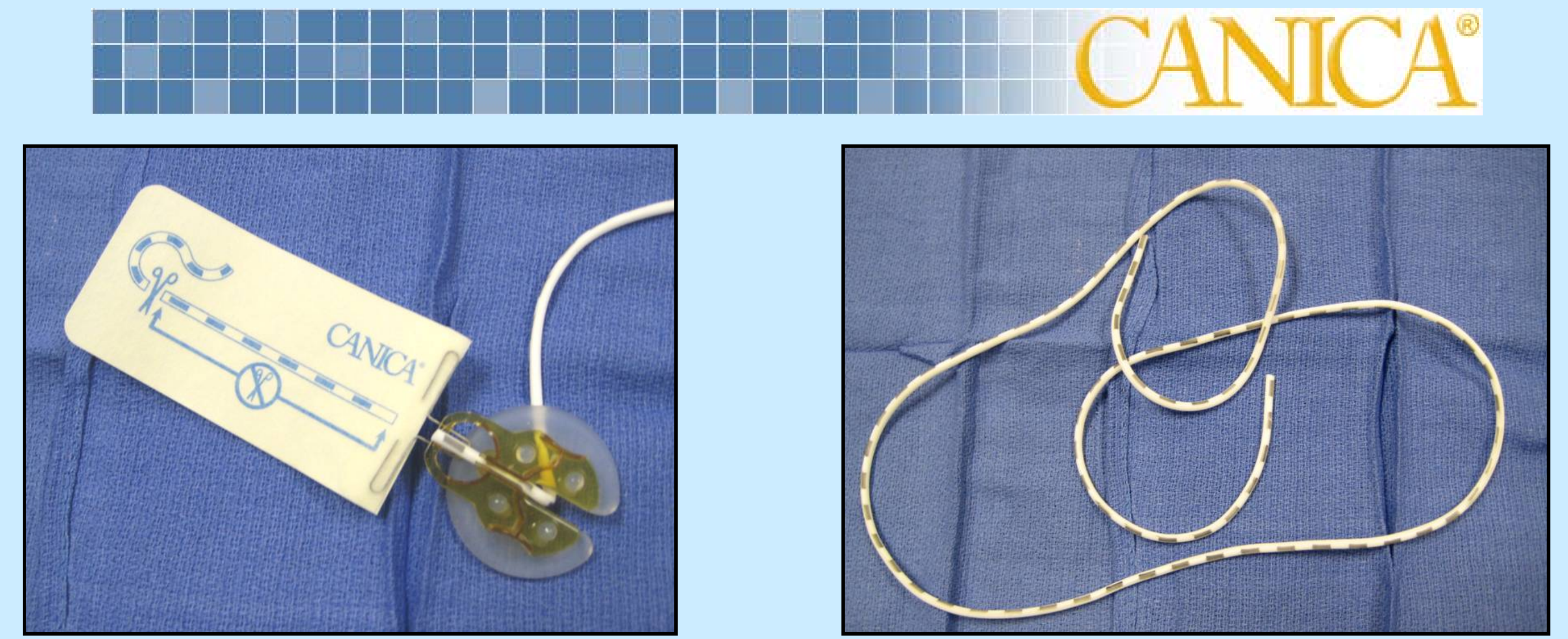
Patients



Methods

- Retrospective review
 - July 2006 to June 2008
- Data
 - indication for open abdomen
 - time to closure
 - closure details
 - number of abdominal operations
 - abdominal complications and hospital resource utilization
- End-points
 - Primary fascial closure
 - Skin closure with intentional hernia
 - Chronic wound with or without skin graft
- Criteria for ABRA:
 - Delayed (> 9 days) closure
 - Earlier if the fascia will clearly not close
 - Surgeon is willing to use the device
- Contraindications:
 - Ongoing intra-abdominal sepsis
 - Ongoing hemodynamic instability

Overview of the Key System Components⁴



Button Anchor, Button Tail and Skin Pad: enables tension adjustments while distributing force over a wider area and protecting skin from breakdown.

Silicone Elastomere: provides the dynamic force that closes the wound. Tension is measured by the indication marks.

How it Works⁴

System Applied: The ABRA® Abdominal Wall Closure System restores the primary closure option for full thickness, retracted midline abdominal defects.

Post-Op Inflammatory Response Period: System expands to control wound edges.

Closure Period: Dynamic re-approximation of muscle/fascia with daily bedside adjustments ("The Move") and reassessment in OR every 2-3 days

Fascia Re-approximated: Over time, the system pulls the muscle planes together under tolerable tension while leaving fascial margins intact and ready to suture for a sound primary closure

Closure: The ABRA System eliminates the hernia without the need for mesh and re-approximates the skin margins, eliminating the need to

Urbaniak et al. Ann Plast

How We Do It

Measuring Elastomere placement: 2.5cm from fascial edge and placement through stab wound made with cautery.

Elastomeres in place **Silicone sheet and tensioning bar placement**

Button Anchor placement and Elastomere tensioning to 1.5-2 times unstretched length

Button Tail placement, re-tensioning Elastomeres, and VAC

Three days and six days after ABRA placement — the fascia is easily closed.

Results

Pt #	Age	Sex	LOS/ICU	Vent Days	NISS/ISS (*APACHE II)	Mechanism	OR before ABRA (Total OR for Abd)	Days open until ABRA	Days to closure	Start Wnd cm ²	End Wnd cm ² (%)	Fascia Closed	Abdominal Complications	End Point
1	44	M	157/40	34	50/41	GSW neck/ACS	4 (8)	16	26	576	0	Y	small bowel obstruction	Primary closure
2	74	M	43/43	24	48/16	MVC/multiple organ injuries	3 (7)	6	13	274	0	Y	perc-drained abd abscess	Primary closure
3	45	M	20/20	18	34/25	GSW/multiple organ injuries	2 (6)	4	13	390	0	Y	none	Primary closure
4	52	M	21/16	13	41/50	Crush/retro-peritoneal hematoma	4 (7)	5	10	504	0	Y	perc-drained pelvic abscess	Primary closure
5	18	M	88/47	43	27/18	GSW abdomen	5 (8)	14	18	261	0	Y	late hernia/laparoscopic VHR	Primary closure
6	17	M	41/41	41	50/50	MVC w/ ACS	4 (7)	6	13	504	0	Y	none	Primary closure
7	76	M	76/30	18	48/41	GSW Abdomen	5 (9)	15	24	437	30 (7)	Y	none	Primary w/ VAC
8	16	F	30/22	21	25/18	MCC/multiple organ injuries	2 (6)	13	19	403	0	Y	none	Primary closure
9	55	M	120/95	65	25/18	MVC/Blunt Abdominal injuries	3 (6)	9	15	346	280 (81)	N	dehiscence/abscess, hernia, fistula	Chronic Granulation
10	43	M	61/50	48	(22*)	Gastric volvulus	6 (9)	17	23	276	45 (16)	Y	none	Primary/alloderm
11	61	F	37/22	68	(24*)	Fistula/incisional hernia	1 (4)	1	6	644	0	Y	Death	Primary closure
12	47	M	33/28	23	(20*)	Infected hernia mesh/open abdomen	1 (4)	1	8	504	0	Y	none	Primary closure
13	72	M	35/29	22	(22*)	Urosepsis/ACS	4 (7)	9	17	343	0	Y	none	Primary closure
14	29	M	16.5	25	(14*)	pancreatic injury/failed	2 (4)	5	10	240	0	Y	none	Primary closure
AVE	47.7	86% M	55.6/33.7+1	33.7+1	38.9/30.9 (20.4*)	64% acute trauma	3.3 (6.6)	8	15+/-6.6	407+/-126	25.4+/-74.6	93%		

Pt # = patient study number; M = male; F = female; LOS = hospital length of stay in days; ICU = intensive care unit length of stay in days; Vent = ventilator; OR = operative procedures; Abd = abdomen; ABRA = Abdominal Reapproximation Anchor System; Start/End Wnd cm² = starting/ending wound area in centimeters squared; GSW = gunshot wound; MVC = motor vehicle collision; ACS = abdominal compartment syndrome; STSG = split-thickness skin graft; VHR = ventral hernia repair

How we compare:

- Technique:**
- Standardized placement
 - Earlier placement of ABRA
 - Uniform use of VAC

- Results**
- Higher primary closure rate
 - Shorter duration of Treatment
 - Fewer Hernias

	ABRA	Reimer
Age	48	55
Male	85%	65%
Acute trauma	64%	13%
Length of stay	59	69
Days before ABRA	9	18
Days after ABRA	7	48
Start wound cm ²	420	367
End wound %	8	5
Primary closure	93%	61%
Primary with adjuncts	17%	14%
Fistula	8%	9%
Hernia	15%	26%

ABRA = Abdominal Reapproximation Anchor System; Start wound cm² = starting wound area in centimeters squared; End wound % = percent of original wound left open

Conclusions

- A standardized approach to open abdominal wounds utilizing the ABRA achieved rapid and reliable closure in selected patients.
- We recommend early application of the device and careful selection of patients based on their physiologic status.
- Further evaluation is required to determine optimal selection and timing for ABRA use and its effects on long-term recovery.

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Suggested Reading

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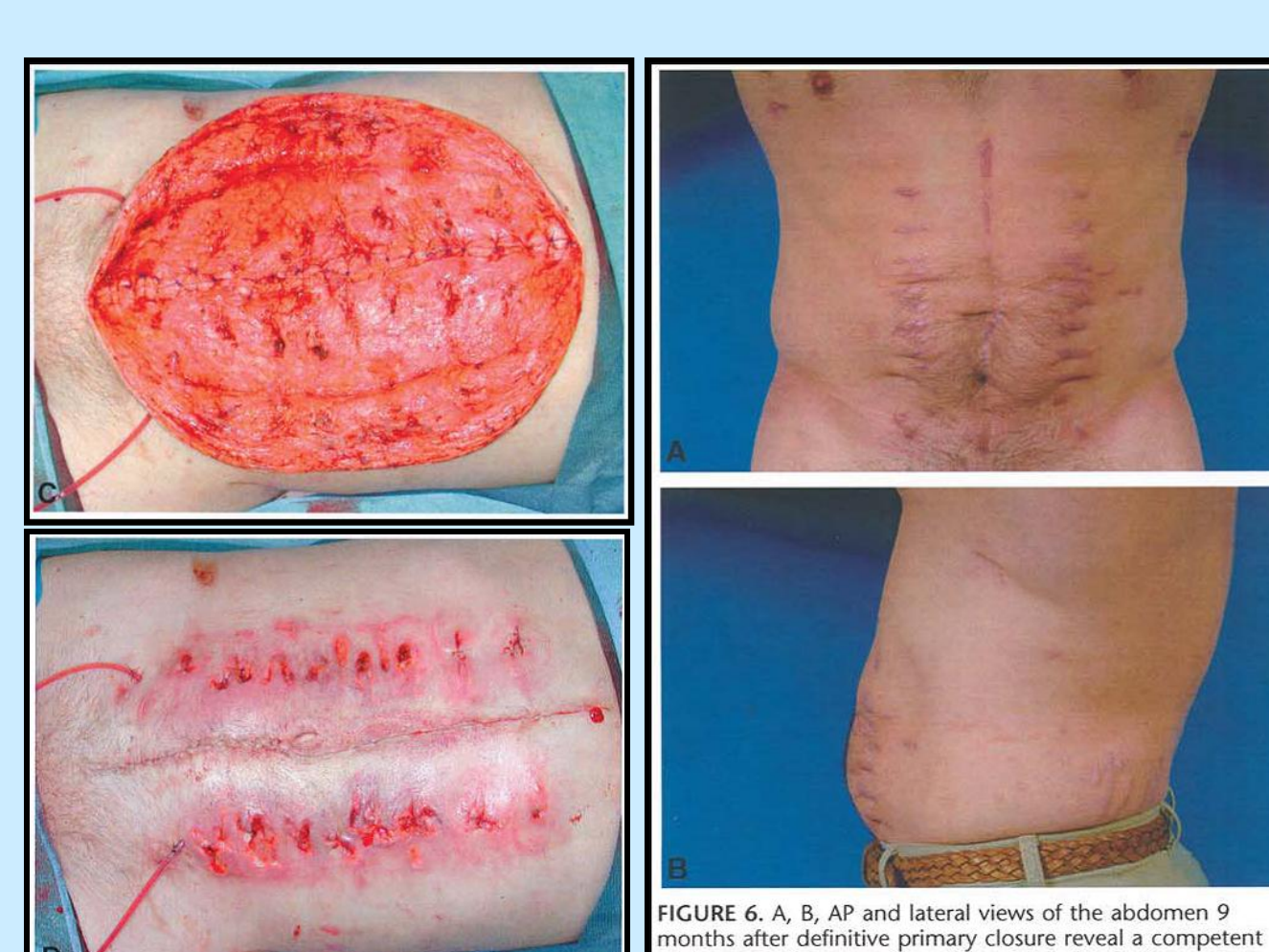


Photo of completed closure from Urbaniak et al. - Ann Plast Surg: