



Napoli 1 SURGERY

NAPOLI 27 – 28 SETTEMBRE

Aula Magna Scuola di Medicina di Scampia

Centro Congressi Università degli Studi di Napoli Federico II



TERAPIA A PRESSIONE NEGATIVA

La NPWT nella Sindrome Compartimentale post trauma

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IAP ed ACS

- ▶ La Pressione Intraddominale (IAP) è la pressione presente all'interno della cavità addominale ed oscilla normalmente tra 0-5mmhg
- ▶ La IAP si misura direttamente tramite un catetere addominale o indirettamente a livello gastrico tramite una manometria o a livello vescicale tramite un catetere di Foley
- ▶ L'Ipertensione Addominale (IAH) insorge quando la IAP>12mm
- ▶ La Sindrome Compartmentale Addominale (ACS) insorge con una IAP>20mmgh
- ▶ L'aumento della IAP causa una diminuzione della Pressione di Perfusion Addominale (APP)
- ▶ La APP è data dalla Pressione Arteriosa Media (MAP)-IAP
- ▶ La APP dovrebbe essere sempre>60mmhg

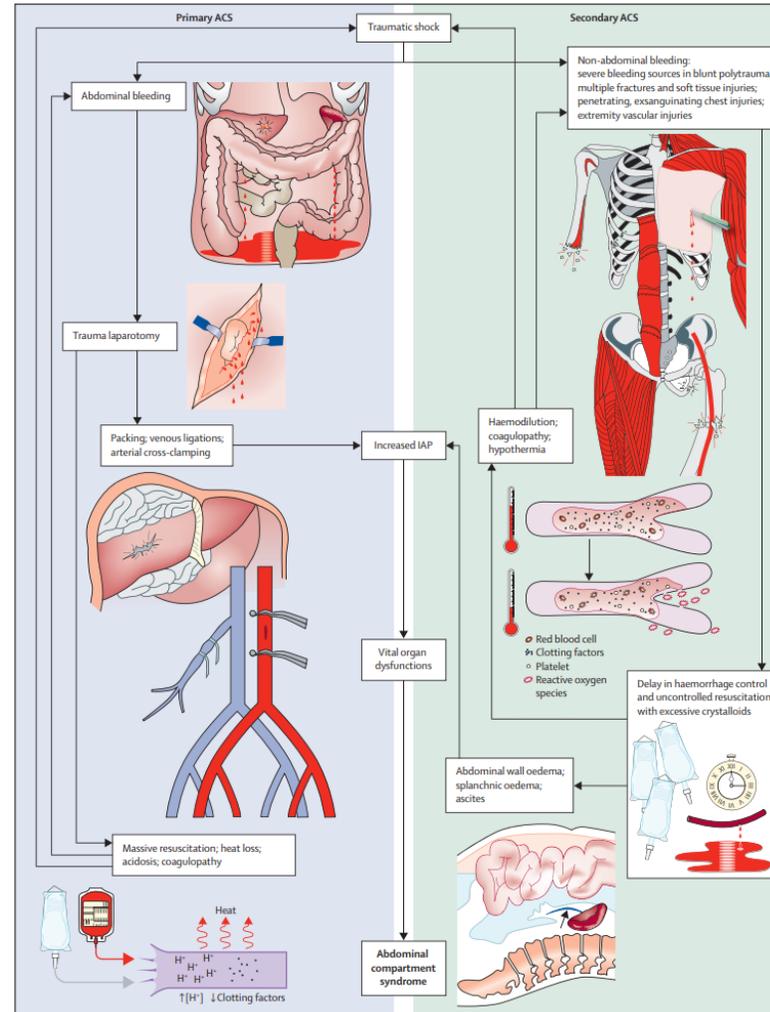


Figure: Pathomechanism of postinjury primary and secondary abdominal compartment syndrome
IAP=intra-abdominal pressure. ACS=abdominal compartment syndrome.

Postinjury abdominal compartment syndrome: from recognition to prevention

Zsolt J Balogh, William Lumsdaine, Ernest E Moore, Frederick A Moore
Lancet 2014; 384: 1466-75

IAP ed ACS

- ▶ Si divide in
 - ▶ Primaria se la sua eziologia dipende direttamente da una lesione o trauma della regione addominopelvica
 - ▶ Secondaria se non origina dalla regione addominopelvica (es. rianimazione con fluidi, sepsi, ustioni)

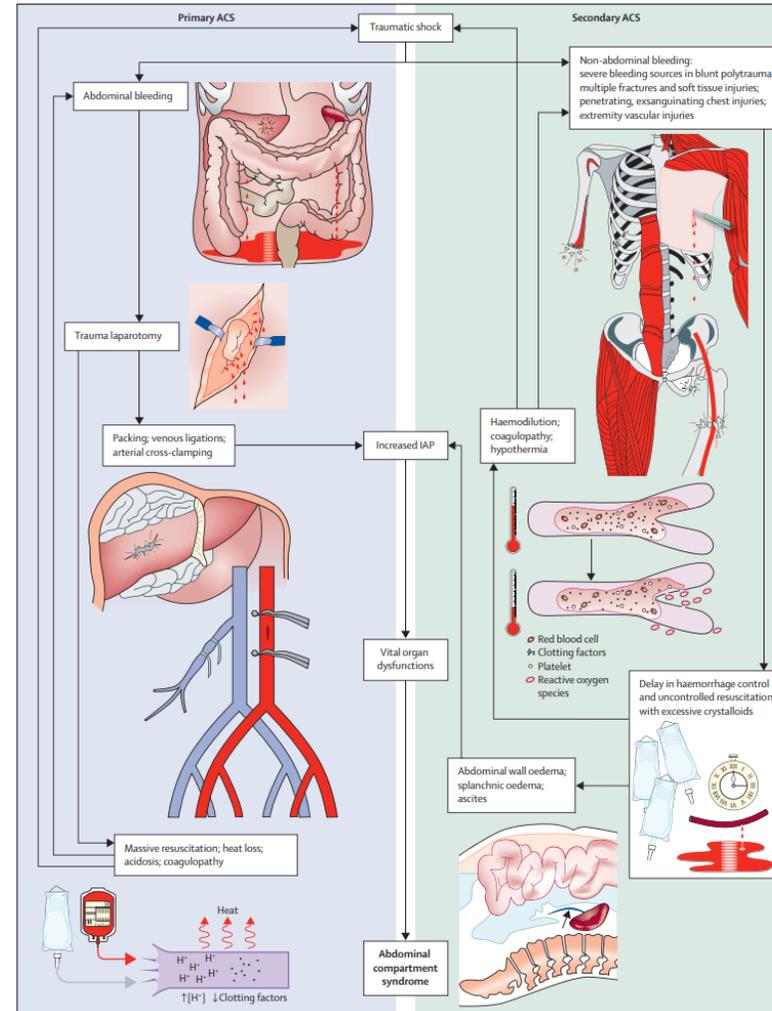


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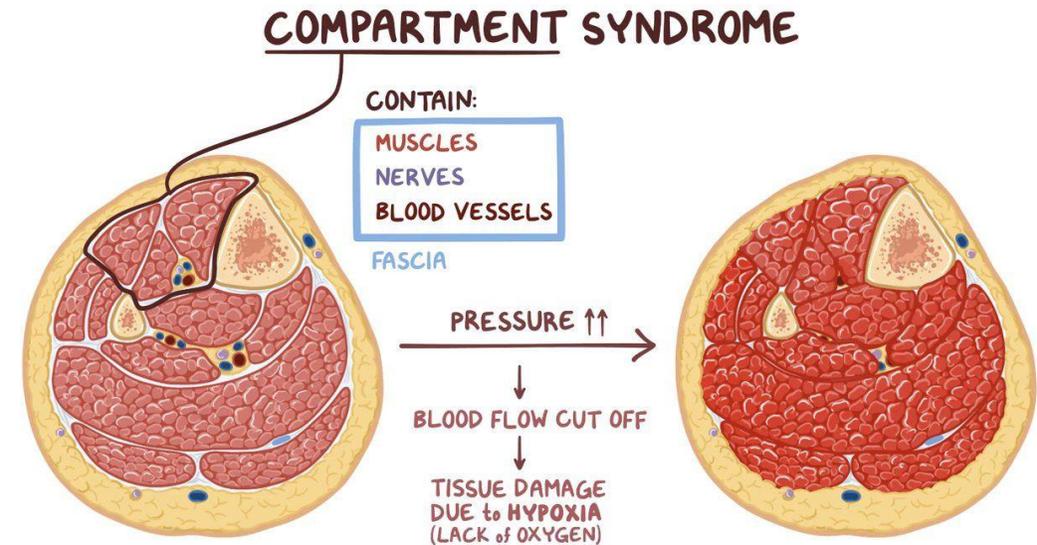
Postinjury abdominal compartment syndrome: from recognition to prevention

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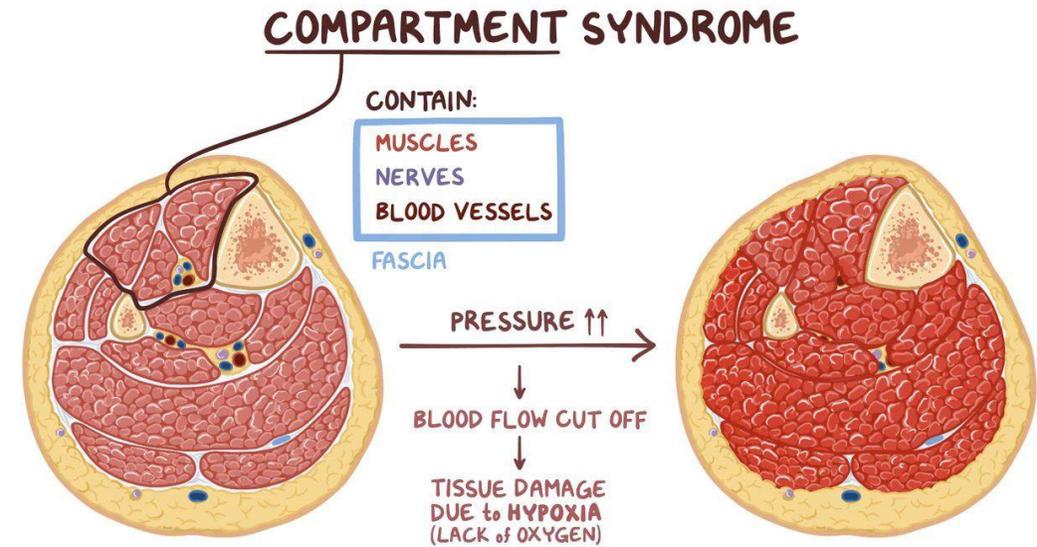
ACS Negli Arti

- ▶ La ACS può insorgere anche a livello degli arti
- ▶ In particolare a livello della gamba dove c'è la presenza di multiple strutture racchiuse all'interno di una fascia, delimitando dei compartimenti
- ▶ L'aumento della pressione all'interno di questi compartimenti causa la riduzione del flusso sanguigno e successivamente danno ipossico



ACS Negli Arti

- ▶ L'ACS negli arti è sempre una emergenza chirurgica
- ▶ Le cause principali sono
 - ▶ Una frattura
 - ▶ Una grave contusione o ematoma
 - ▶ Sindromi traumatiche da schiacciamento
 - ▶ Bendaggi compressivi
 - ▶ Iperafflusso sanguigno post ischemia



Management ACS

- Identificare eziologia ACS
- Valutare trattamenti medici se paziente stabile e non sono già stati adoperati

Intra-abdominal hypertension and the abdominal compartment syndrome: updated consensus definitions and clinical practice guidelines from the World Society of the Abdominal Compartment Syndrome

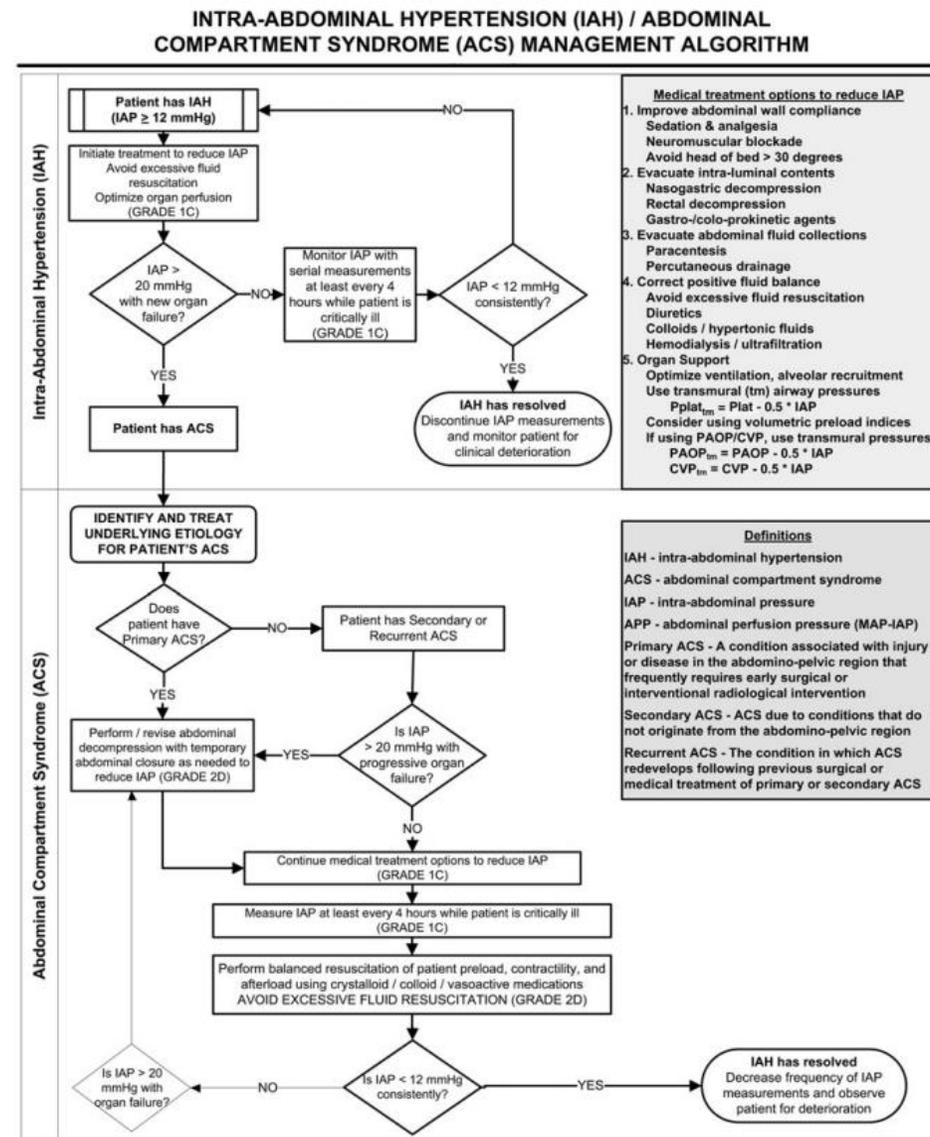


Fig. 1 Updated intra-abdominal hypertension (IAH)/abdominal compartment syndrome (ACS) management algorithm. IAP intra-abdominal pressure

Management ACS

- ▶ Drenare il contenuto intraluminale
- ▶ Evacuare lesioni intraddominali occupant spazio
- ▶ Migliorare wall compliance
- ▶ Ottimizzare la somministrazione dei liquidi
- ▶ Ottimizzare la perfusione sistemica e regionale

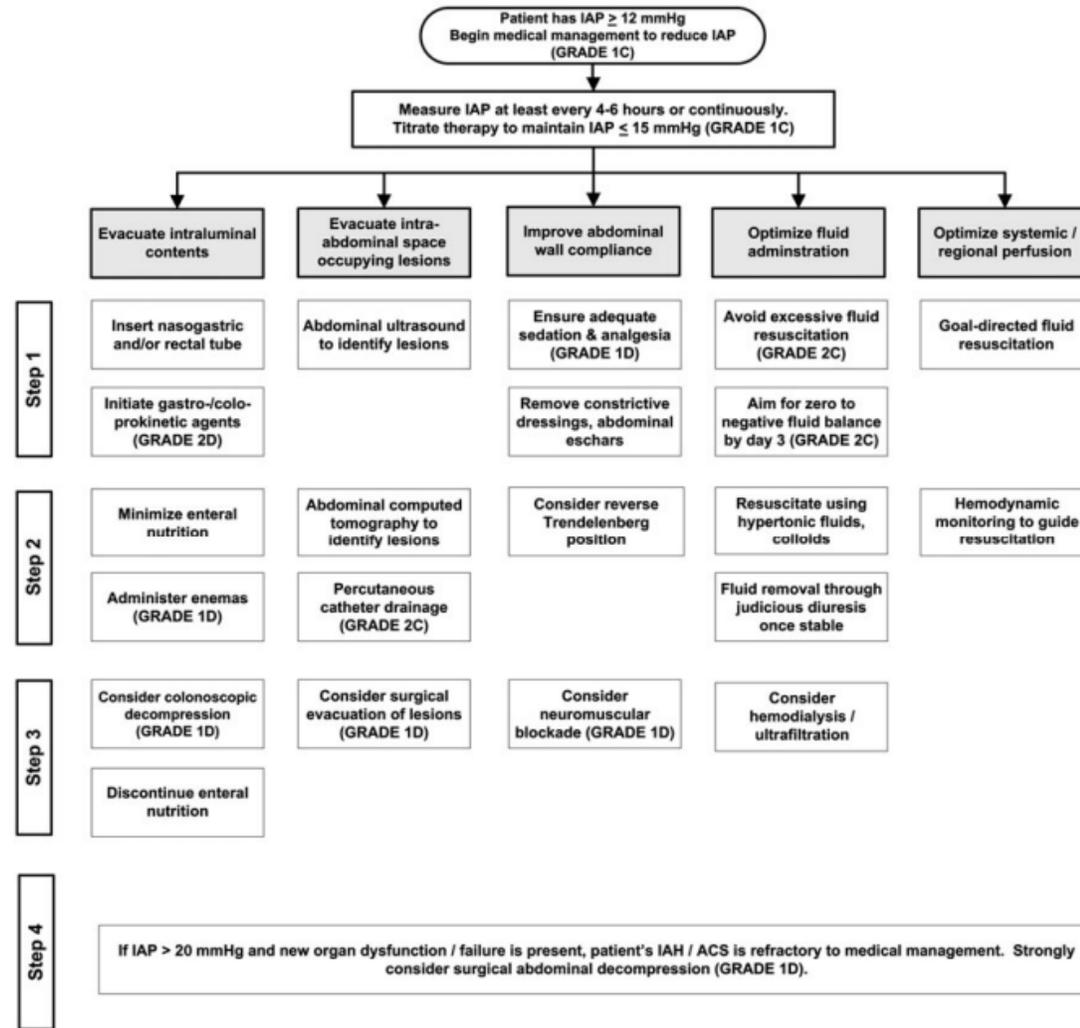


Fig. 2 Updated intra-abdominal hypertension (IAH)/abdominal compartment syndrome (ACS) medical management algorithm. IAP intra-abdominal pressure

Intra-abdominal hypertension and the abdominal compartment syndrome: updated consensus definitions and clinical practice guidelines from the World Society of the Abdominal Compartment Syndrome

Intensive Care Med (2013) 39:1190–1206
DOI 10.1007/s00134-013-2906-z

OA: quando e perchè

- ▶ Damage Control Management (DMC= DCR+DCS) ⇔ IAH/ACS ⇔ MOF

(circolo vizioso interrotto dalla decompressione)

- ▶ pH lower than 7.2
- ▶ core temperature lower than 34°C,
- ▶ estimated blood loss greater than 4 L
- ▶ transfusion requirement of more than 10 U of packed red blood cells
- ▶ systolic blood pressure less than 70 mm Hg
- ▶ lactate levels greater than 5 mmol/L
- ▶ base deficit (BD) greater than -6 in patients older than 55 years or greater than -15 in patients younger than 55 years,
- ▶ prothrombin time greater than 1.6

Review > [J Trauma](#). 2010 Jun;68(6):1425-38. doi: 10.1097/TA.0b013e3181da0da5.

The management of the open abdomen in trauma and emergency general surgery: part 1-damage control

Jose J Diaz Jr ¹, Daniel C Cullinane, William D Dutton, Rebecca Jerome, Richard Bagdonas, Jaroslaw W Bilaniuk, Bryan R Collier, John J Como, John Cumming, Maggie Griffen, Oliver L Gunter, John Kirby, Larry Lottenburg, Nathan Mowery, William P Riordan Jr, Niels Martin, Jon Platz, Nicole Stassen, Eleanor S Winston

Comparative Study > [Am Surg](#). 2008 Oct;74(10):891-7. doi: 10.1177/000313480807401002.

A prospective look at the current state of open abdomens

Pedro G R Teixeira ¹, Ali Salim, Kenji Inaba, Carlos Brown, Timothy Browder, Daniel Margulies, Demetrios Demetriades

Management ACS

- ▶ «the two major indications for the use of the OA in trauma are the prevention of abdominal ACS or its treatment if medical strategies have failed and DCS for intra-abdominal life-threatening bleeding.»

Coccolini et al. World Journal of Emergency Surgery (2018) 13:7
DOI 10.1186/s13017-018-0167-4

World Journal of
Emergency Surgery

REVIEW

Open Access



The open abdomen in trauma and non-trauma patients: WSES guidelines

Federico Coccolini^{1*}, Derek Roberts², Luca Ansaloni¹, Rao Ivatury³, Emiliano Gamberini⁴, Yoram Kluger⁵, Ernest E. Moore⁶, Raul Coimbra⁷, Andrew W. Kirkpatrick², Bruno M. Pereira⁸, Giulia Montori¹, Marco Ceresoli¹, Fikri M. Abu-Zidan⁹, Massimo Sartelli¹⁰, George Velmahos¹¹, Gustavo Pereira Fraga⁸, Ari Leppaniemi¹², Matti Tolonen¹², Joseph Galante¹³, Tarek Razek¹⁴, Ron Maier¹⁵, Miklos Bala¹⁶, Boris Sakakushev¹⁷, Vladimir Khokha¹⁸, Manu Malbrain¹⁹, Vanni Agnoletti⁴, Andrew Peitzman²⁰, Zaza Demetrasvili²¹, Michael Sugrue²², Salomone Di Saverio²³, Ingo Martzi²⁴, Kjetil Soreide^{25,26}, Walter Biffi²⁷, Paula Ferrada³, Neil Parry²⁸, Philippe Montravers²⁹, Rita Maria Melotti³⁰, Francesco Salvetti¹, Tino M. Valetti³¹, Thomas Scalea³², Osvaldo Chiara³³, Stefania Cimbanassi³³, Jeffrey L. Kashuk³⁴, Martha Larrea³⁵, Juan Alberto Martinez Hernandez³⁶, Heng-Fu Lin³⁷, Mircea Chirica³⁸, Catherine Arvieux³⁸, Camilla Bing³⁹, Tal Horer⁴⁰, Belinda De Simone⁴¹, Peter Masiakos⁴², Viktor Reva⁴³, Nicola DeAngelis⁴⁴, Kaoru Kike⁴⁵, Zsolt J. Balogh⁴⁶, Paola Fugazzola¹, Matteo Tomasoni¹, Rifat Latifi⁴⁷, Noel Naidoo⁴⁸, Dieter Weber⁴⁹, Lauri Handolin⁵⁰, Kenji Inaba⁵¹, Andreas Hecker⁵², Yuan Kuo-Ching⁵³, Carlos A. Ordoñez⁵⁴, Sandro Rizoli⁵⁵, Carlos Augusto Gomes⁵⁶, Marc De Moya⁵⁷, Imtiaz Wani⁵⁸, Alain Chichom Mefire⁵⁹, Ken Boffard⁶⁰, Lena Napolitano⁶¹ and Fausto Catena⁶²

1. Indications for OA in Trauma Patients

Questions

- A. Is empiric use of OA indicated in patients with risk factors for ACS?
- B. When is surgical abdominal decompression formally required in ACS?
- C. What conditions, other than ACS, require OA in trauma?

Statements

- A. Empiric use of OA in trauma patients with risk factors for ACS is indicated:

in the case of DCS for bleeding injuries requiring packing and planned reoperation within a day or two [GoR B, LoE II]

in the presence of extreme visceral or retroperitoneal swelling or elevated bladder pressure; after surgery when abdominal closure is attempted [GoR B, LoE II]

- B. Decompressive laparotomy is indicated in ACS if medical treatment has failed [GoR B, LoE II]

- C. Other conditions that require OA in trauma are as follows:

in the presence vascular/gastrointestinal injuries, mesenteric ischemia, or hematoma, necessitating a second look [GoR B, LoE II]

if gross peritoneal contamination not amenable to resolution at the first operation is present [GoR C, LoE II]

in the case of major abdominal wall tissue loss [GoR B, LoE II]

when the patient's fascia is in poor condition [GoR C, LoE II]

OA nel trauma: indicazioni

International consensus conference on open abdomen in trauma

Oswaldo Chiara, MD, Stefania Cimbanassi, MD, Walter Biffl, MD, Ari Leppaniemi, MD, Sharon Henry, MD, Thomas M. Scalea, MD, Fausto Catena, MD, Luca Ansaloni, MD, Arturo Chieragato, MD, Elvio de Blasio, MD, Giorgio Gambale, MD, Giovanni Gordini, MD, Giuseppe Nardi, MD, Pietro Paldalino, MD, Francesco Gossetti, MD, Paolo Dionigi, MD, Giuseppe Noschese, MD, Gregorio Tugnoli, MD, Sergio Ribaldi, MD, Sebastian Sgardello, MD, Stefano Magnone, MD, Stefano Rausei, MD, Anna Mariani, MD, Francesca Mengoli, MD, Salomone di Saverio, MD, Maurizio Castriconi, MD, Federico Coccolini, MD, Joseph Negreanu, MD, Salvatore Razzi, MD, Carlo Coniglio, MD, Francesco Morelli, RN, Maurizio Buonanno, MD, Monica Lippi, MD, Liliana Trotta, RN, Annalisa Volpi, MD, Luca Fattori, MD, Mauro Zago, MD, Paolo de Rai, MD, Fabrizio Sammartano, MD, Roberto Manfredi, MD, and Emiliano Cingolani, MD, Milan, Italy

OPEN ABDOMEN (OA)

► Chiusura ostacolata dall'edema dei visceri

► Impossibilità di controllare la fonte dell'infezione

► Pianificazione di un «second-look»

► Completamento DCS/danni alla parete addominale

OA complication

OA management consists of intentionally leaving the abdominal fascial edges of the paired rectus abdominus muscles un-approximated (laparostomy) in order to truncate operation, prevent IAH/ACS, and facilitate re-exploration without damaging the abdominal fascia

OA: «non-anatomic situation that has potential for severe side effects while increasing resource utilization»

«Patients undergoing OA management are at risk of developing entero-atmospheric fistula (EAF) and a “frozen abdomen,” intra-abdominal abscesses, and lower rates of definitive fascial closure»

Leppäniemi *Critical Care* 2010, **14**:216
<http://ccforum.com/content/14/2/216>



REVIEW

Laparostomy: why and when?

Ari K Leppäniemi*

This article is one of ten reviews selected from the *Yearbook of Intensive Care and Emergency Medicine 2010* (Springer Verlag) and co-published as a series in *Critical Care*. Other articles in the series can be found online at <http://ccforum.com/series/yearbook>. Further information about the *Yearbook of Intensive Care and Emergency Medicine* is available from <http://www.springer.com/series/2855>.

Coccolini et al. *World Journal of Emergency Surgery* (2017) 12:39
DOI 10.1186/s13017-017-0146-1

World Journal of
Emergency Surgery

REVIEW

Open Access



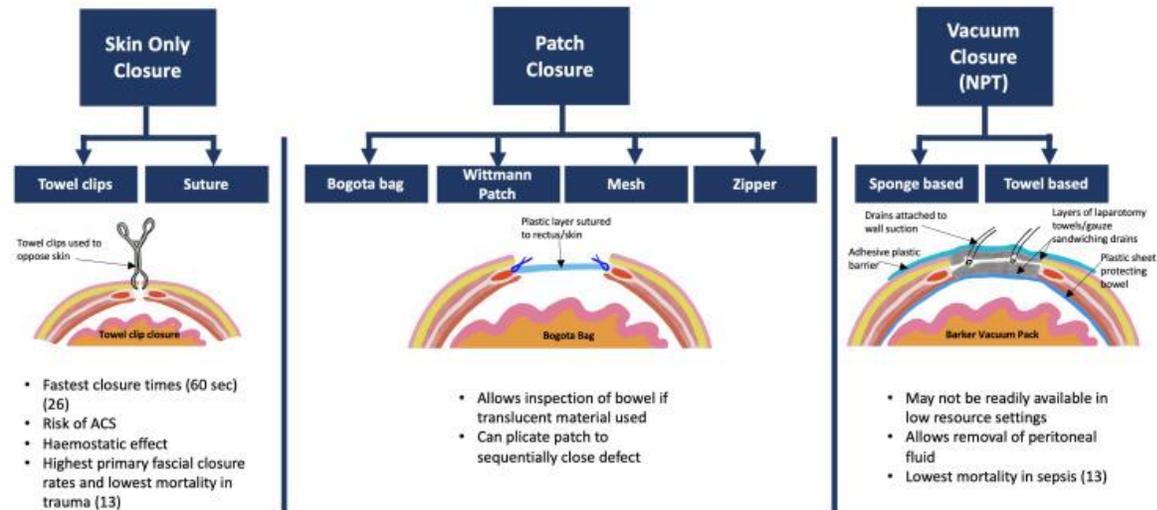
The role of open abdomen in non-trauma patient: WSES Consensus Paper

Federico Coccolini^{1*}, Giulia Montori¹, Marco Ceresoli¹, Fausto Catena², Ernest E. Moore³, Rao Ivatury⁴, Walter Biffi⁵, Andrew Peitzman⁶, Raul Coimbra⁷, Sandro Rizoli⁸, Yoram Kluger⁹, Fikri M. Abu-Zidan¹⁰, Massimo Sartelli¹¹, Marc De Moya¹², George Velmahos¹², Gustavo Pereira Fraga¹³, Bruno M. Pereira¹³, Ari Leppäniemi¹⁴, Marja A. Boermeester¹⁵, Andrew W. Kirkpatrick¹⁶, Ron Maier¹⁷, Miklosh Bala¹⁸, Boris Sakakushev¹⁹, Vladimir Khokha²⁰, Manu Malbrain²¹, Vanni Agnoletti²², Ignacio Martin-Loeches²³, Michael Sugrue²⁴, Salomone Di Saverio²⁵, Ewen Griffiths²⁶, Kjetil Soreide^{27,28}, John E. Mazuski²⁹, Addison K. May³⁰, Philippe Montravers³¹, Rita Maria Melotti³², Michele Pisano¹, Francesco Salvetti¹, Gianmariano Marchesi³³, Tino M. Valetti³³, Thomas Scalea³⁴, Osvaldo Chiara³⁵, Jeffrey L. Kashuk³⁶ and Luca Ansaloni¹

Management ACS

- Ci sono diverse tecniche per gestire un'open abdomen
- La NPWT resta tra le migliori quando disponibile

Options for Temporary Abdominal Closure



Best Technique for TAC options

▶ skin approximation techniques



Towel clip



Bogotá bag

▶ Skin Only

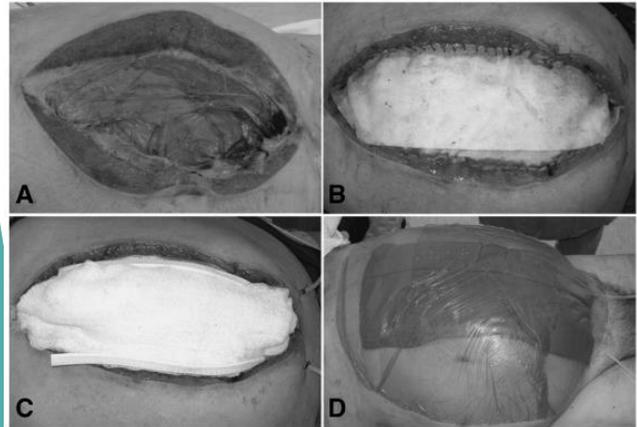
- ▶ Leak di fluidi
- ▶ Eviscerazione
- ▶ Retrazione della parete
- ▶ Rischio di fistula Entero Atmosferica
- ▶ Tecnica più veloce
- ▶ Maggiore effetto emostatico

Best Technique for TAC options

- ▶ fascial closure techniques (FCTs), using an interposition graft material sutured to the abdominal fascia (e.g., the Wittmann Patch)



Mesh technique, Vicryl mesh



Wittmann patch technique

▶ Patch Closure

- ▶ Aumenta rischio di trauma a visceri e fascia
- ▶ Non Consente evacuazione di fluidi
- ▶ Riduce la percentuale di chiusura per prima intenzione ed aumenta il rischio di fistula Entero Atmosferica quando non si usa materiale riassorbibile
- ▶ Permette l'ispezione dei visceri se si utilizza un materiale trasparente
- ▶ Permette il graduale avvicinarsi dei margini utilizzando protesi gradualmente più piccole

Best Technique for TAC

- ▶ The ideal method for TAC
- ▶ should prevent loss of domain
- ▶ limit contamination
- ▶ allow egress of peritoneal fluid
- ▶ and avoid adhesion formation
- ▶ It should also be cost- effective.

Universally available

Easy and fast to apply

Porous

Control fluid loss

Leave fascia and skin intact

Not reactive to bowel and organs

Easy to remove and to replace

Keeps peritoneal cavity sterile

Cheap

Best Technique for TAC: option

▶ NPWT



Barker vacuum-pack technique



V.A.C. system



ABTHERA™ Open Abdomen Dressing

▶ NPWT

- ▶ Di difficile disponibilità in contesti sociali disagiati
- ▶ Permette la rimozione di liquido peritoneale
- ▶ Riduce la mortalità per sepsi

NPWT device

- ▶ In severely traumatized patients, an exaggerated systemic inflammatory response occurs because of activation of proinflammatory cytokines, mostly into the peritoneal cavity. This phenomenon is probably related to microcirculatory disruption induced by hemorrhagic shock, which may lead to loss of intestinal barrier function, bowel edema, and formation of proinflammatory-mediator-rich ascites.
- ▶ Negative-pressure devices that allow peritoneal fluid egress may reduce local cytokine levels.
- ▶ The use of instillation with NPWT seems to improve bowel loop moisture, preventing adhesions and improving abdominal closure rates.
- ▶ To reduce the risk of fistula formation in the presence of an intestinal anastomosis while applying NPWT, the surgeon must ensure that the anastomotic site is technically sound. It should be buried deeply within the pelvis or central abdomen under multiple loops of bowel or out laterally under the abdominal wall
- ▶ In the presence of fistulas in OA, NPWT makes it possible to isolate the fistula, protecting the surrounding tissues from enteric spillage; different techniques and devices (nipple, fistula ring, floating stoma) can be applied to control fistula effluent; direct intubation of fistulas is not recommended.

STUDY PROTOCOL

Open Access

Efficacy and safety of active negative pressure peritoneal therapy for reducing the systemic inflammatory response after damage control laparotomy (the Intra-peritoneal Vacuum Trial): study protocol for a randomized controlled trial

Derek J Roberts^{1,2}, Craig N Jenne^{3,8}, Chad G Ball^{1,4,5}, Corina Tiruta¹, Caroline Léger^{3,8}, Zhengwen Xiao⁵, Peter D Faris^{2,6}, Paul B McBeth⁹, Christopher J Doig^{2,3}, Christine R Skinner³, Stacy G Ruddell¹, Paul Kubes^{3,7,8} and Andrew W Kirkpatrick^{1,3,5*}

Comparative Study > [Int Wound J.](#) 2013 Apr;10(2):214-20.

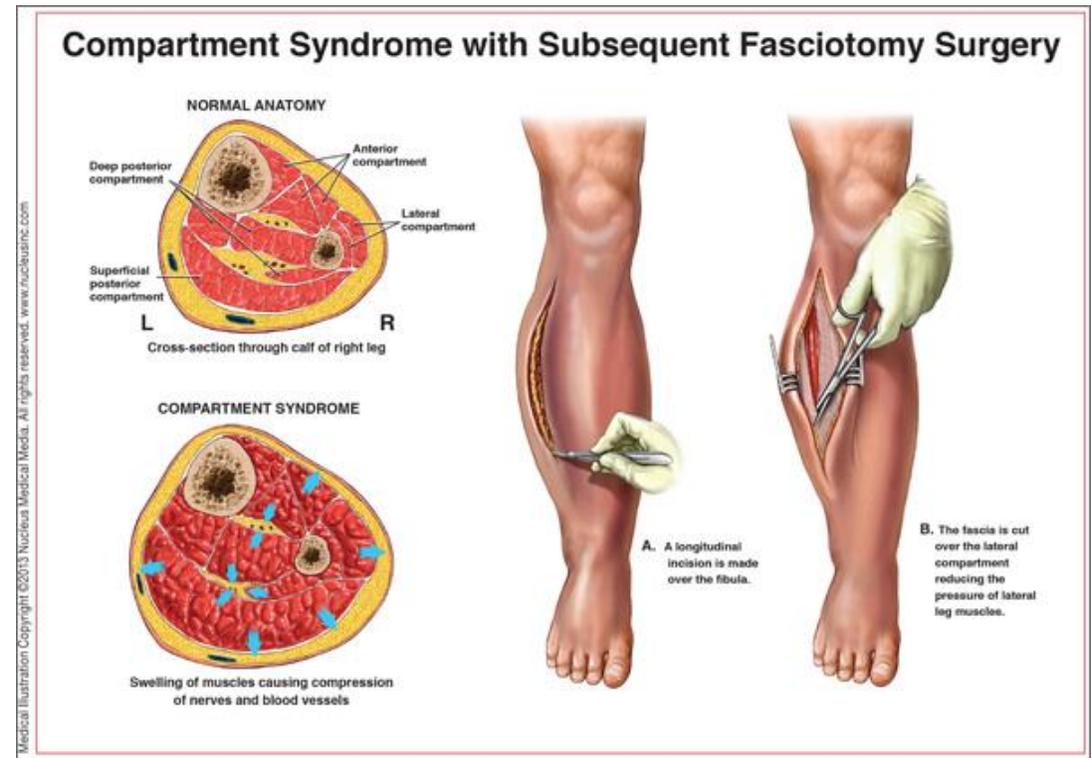
doi: 10.1111/j.1742-481X.2012.00968.x. Epub 2012 Apr 4.

Distribution assessment comparing continuous and periodic wound instillation in conjunction with negative pressure wound therapy using an agar-based model

Anthony M Rycerz¹, Paul Slack, Amy K McNulty

Management ACS Negli Arti

- ▶ Necessaria misurazione della pressione intracompartimentale (ICP) nei casi incerti
- ▶ Una ICP > 30 mmHg è indicazione ad una fasciotomia d'emergenza
- ▶ La finestra ideale è tra le 6 e le 36 ore dopo l'inizio dell'ACS



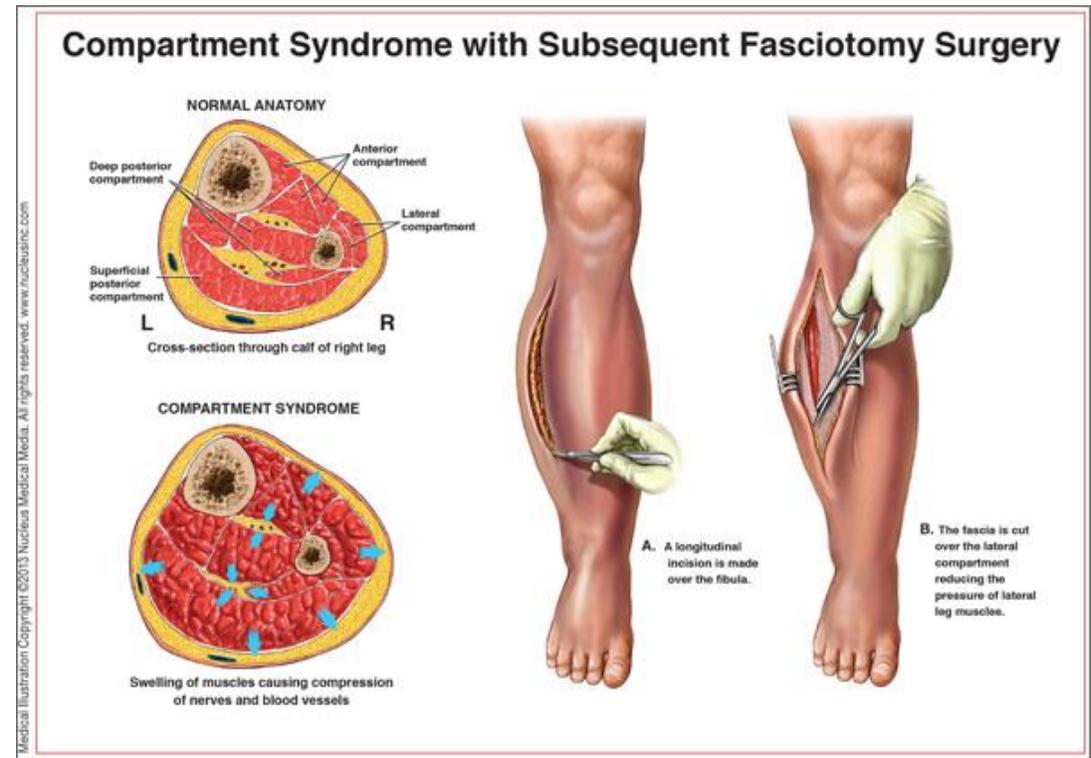
Acute Compartment Syndrome

Allison M. Torlincasi¹, Richard A. Lopez², Muhammad Waseem³

In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan. 2023 Jan 16.

Management ACS Negli Arti

- ▶ Dopo le 36 ore il danno ischemico è già consolidato e non c'è più indicazione alla fasciotomia
- ▶ Se si riscontra necrosi durante la fasciotomia si deve valutare l'amputazione

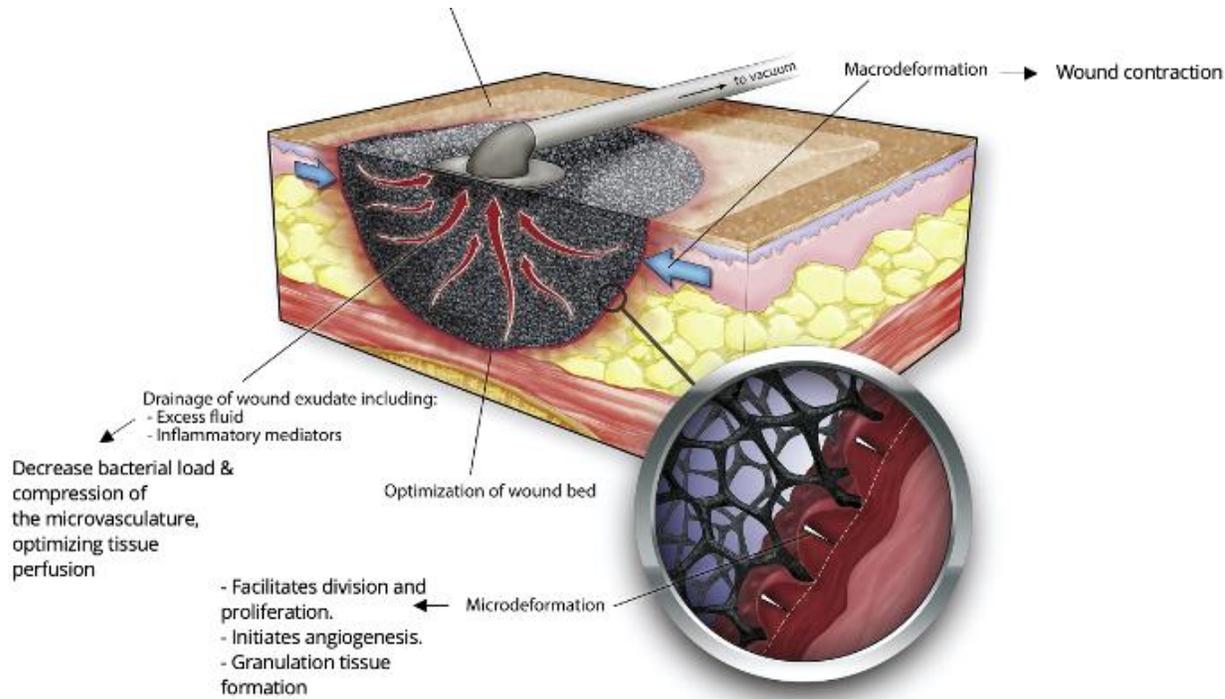


Acute Compartment Syndrome

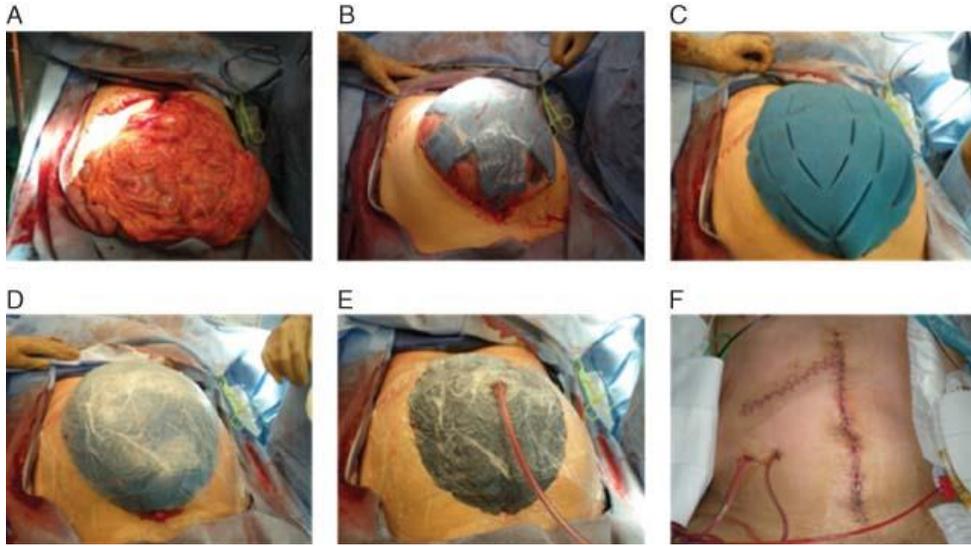
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NPWT

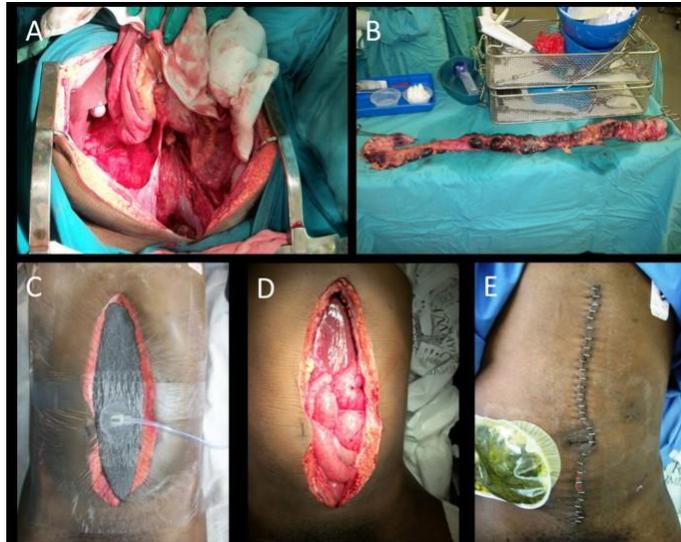


- ▶ La terapia a pressione negativa (NPWT) è utilizzata da anni per facilitare la chiusura di ferite
- ▶ Può essere applicata sia in caso di open abdomen che in caso di fasciotomia



NPWT Nell'Open Abdomen

- ▶ NPWT è comunemente utilizzata nell'open abdomen come Temporary Abdominal Closure (TAC)



What is the effectiveness of the negative pressure wound therapy (NPWT) in patients treated with open abdomen technique? A systematic review and meta-analysis

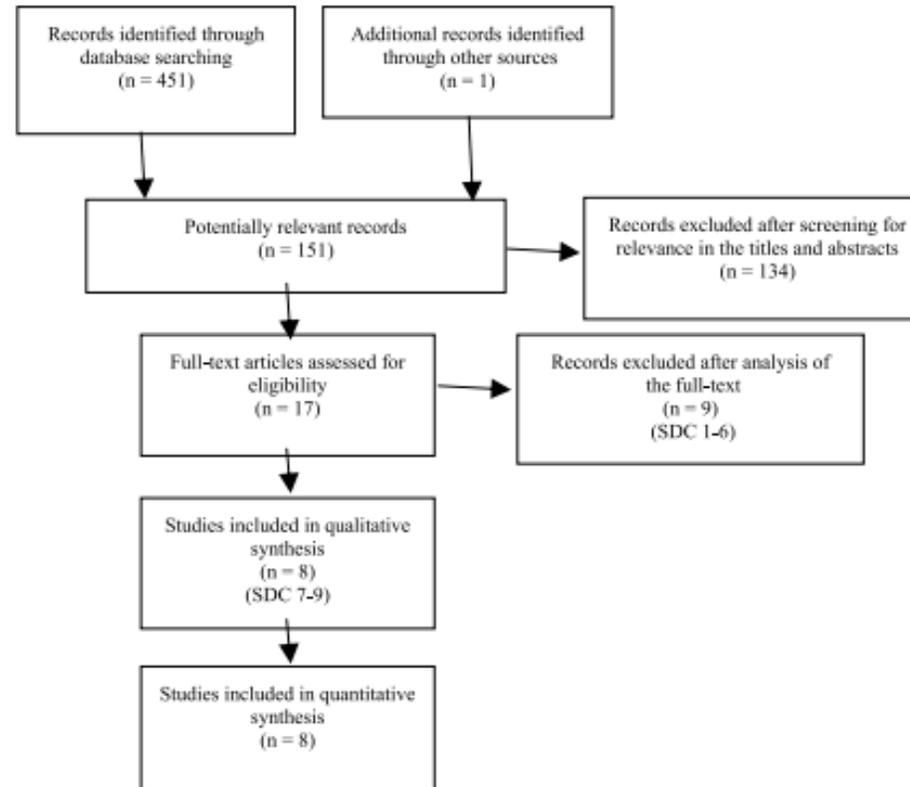
Roberto Cirocchi, MD, PhD, Arianna Birindelli, MD, Walter L. Biffi, MD, Ventsislav Mutafchiyski, DSci, Georgi Popivanov, PhD, Osvaldo Chiara, MD, Gregorio Tugnoli, MD, PhD, and Salomone Di Saverio, MD, Bologna, Italy

NPWT Nell'Open Abdomen

DOI: 10.1097/TA.0000000000001126

J Trauma Acute Care Surg
Volume 81, Number 3

- ▶ Systematic review di Medline, Cochrane e Pubmed
- ▶ Sono state ricercate le seguenti parole in tutte le possibili combinazioni
 - ▶ vacuum assisted closure
 - ▶ vac
 - ▶ open abdomen
 - ▶ damage control surgery
 - ▶ temporary abdominal closure



What is the effectiveness of the negative pressure wound therapy (NPWT) in patients treated with open abdomen technique? A systematic review and meta-analysis

Roberto Cirocchi, MD, PhD, Arianna Birindelli, MD, Walter L. Biffl, MD, Ventsislav Mutafchiyski, DSci, Georgi Popivanov, PhD, Osvaldo Chiara, MD, Gregorio Tugnoli, MD, PhD, and Salomone Di Saverio, MD, Bologna, Italy

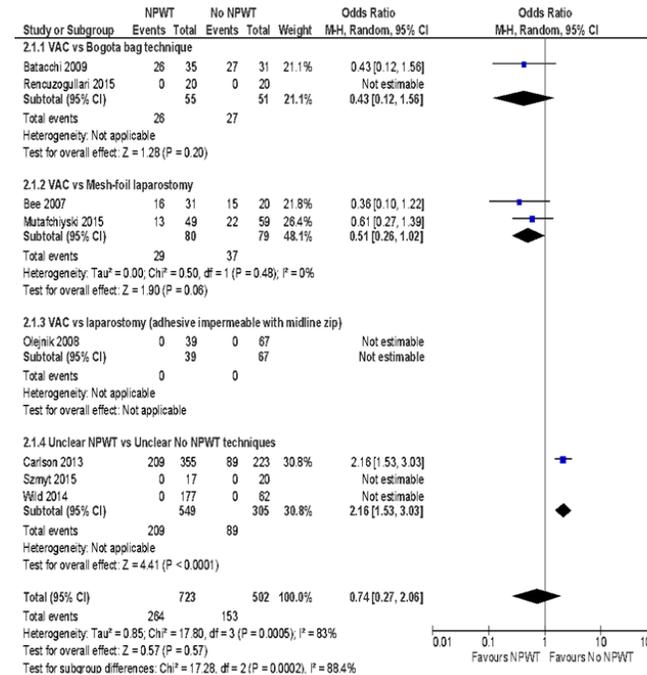
DOI: 10.1097/TA.0000000000001126

J Trauma Acute Care Surg
Volume 81, Number 3

NPWT Nell'Open Abdomen

- ▶ Outcome primario → Chiusura della fascia
- ▶ Outcome secondari
 - ▶ Mortalità nei 30 giorni post-op
 - ▶ Morbidità nei 30 giorni post-op
 - ▶ Incidenza fistola enteroatmosferica
 - ▶ Formazione ascessi addominali
 - ▶ Permanenza in terapia intensiva

SDC 11, Figure: Primary fascial closure.



What is the effectiveness of the negative pressure wound therapy (NPWT) in patients treated with open abdomen technique? A systematic review and meta-analysis

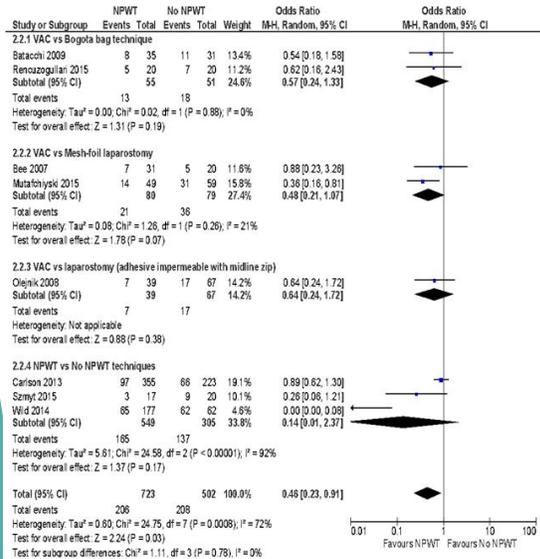
Roberto Cirocchi, MD, PhD, Arianna Birindelli, MD, Walter L. Biffl, MD, Ventsislav Mutafchiyski, DSci, Georgi Popivanov, PhD, Osvaldo Chiara, MD, Gregorio Tugnoli, MD, PhD, and Salomone Di Saverio, MD, Bologna, Italy

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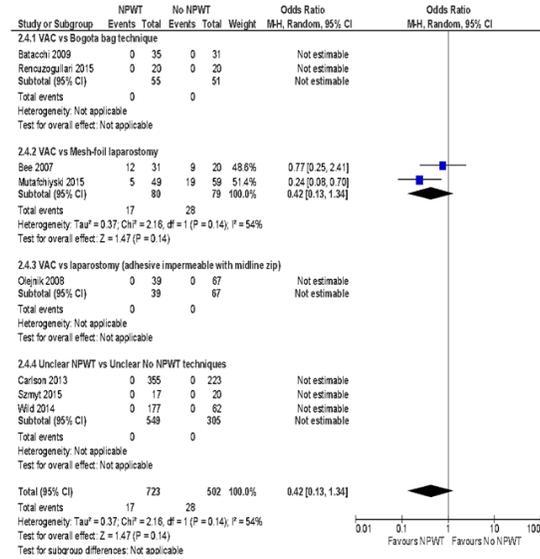
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NPWT Nell'Open Abdomen

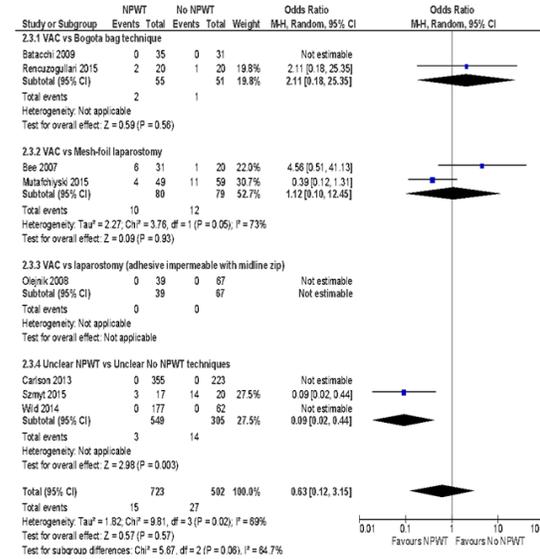
SDC 12, Figure. Post-operative mortality.



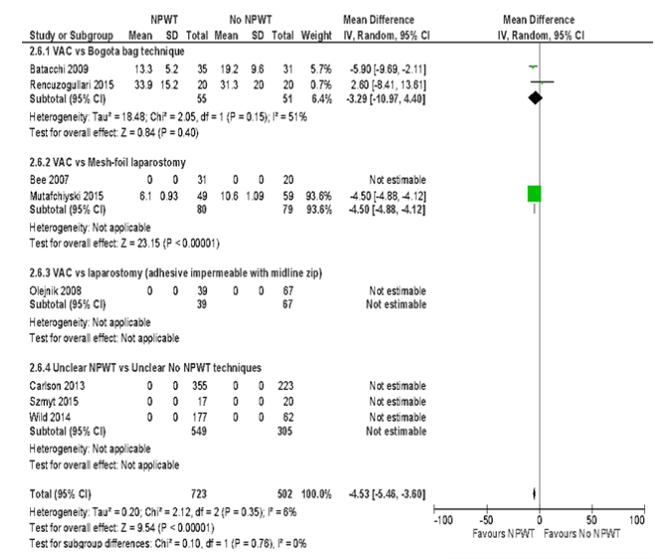
SDC 14, Figure. Abdominal abscess rate.



SDC 13, Figure. Enteroatmospheric fistulas



SDC 16, Figure. Length of stay in ICU.





The open abdomen in trauma and non-trauma patients: WSES guidelines

Federico Coccolini^{1*}, Derek Roberts², Luca Ansaloni¹, Rao Ivatury³, Emiliano Gamberini⁴, Yoram Kluger⁵,

- ▶ La NPWT può essere utilizzata assieme ad una protesi biologica per facilitare la granulazione e la chiusura della cute
 - ▶ Raccomandazione debole supportata da evidenze di qualità media

NPWT Nell'Open Abdomen

NPWT Nella Fasciotomia

- ▶ Numerosi studi hanno valutato l'utilizzo della NPWT a seguito di fasciotomia per ACS
- ▶ Attualmente metodo consigliato in ferite asettiche in pazienti sia adulti che pediatrici
- ▶ Eventuale valutazione a posizionamento di graft cutaneo

Negative Pressure Wound Therapy

Vasudev Zaver ¹, Pradeep Kankanalu ²

In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan. 2022 Sep 9.

Affiliations + expand

PMID: 35015413 Bookshelf ID: [NBK576388](#)

Lee G, Murray P C, Hasegawa I G (March 25, 2020) Closed Incision Negative Pressure Wound Therapy in the Management of a Complex Fasciotomy Wound in a Pediatric Patient. Cureus 12(3): e7413. doi:10.7759/cureus.7413



Principles of Fasciotomy Closure After Compartment Syndrome Release

Shafic Sraj, MD 

Joshua T. Henderson, MD

Michelle Bramer, MD

Jack Gelman, MD

J Am Acad Orthop Surg 2022;30:879-887

DOI: 10.5435/JAAOS-D-21-01046

NPWT Nella Fasciotomia

- ▶ Ultima review dei principi della chiusura della fasciotomia post ACS
- ▶ Conferma che la NPWT permette ad una percentuale maggiore di fasciotomie di essere chiuse senza graft cutaneo paragonandola alle normali tecniche di riavvicinamento dei margini della ferita
- ▶ Conferma che l'utilizzo della NPWT rispetto a tutte le altre metodiche è la più veloce per tempo di risoluzione
- ▶ Conferma che è la miglior metodica per trattare fasciotomie infette

NPWT Nella Fasciotomia



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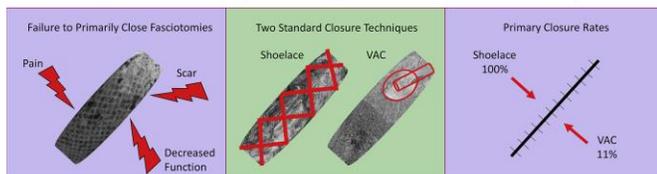


Management of extremity fasciotomy sites prospective randomized evaluation of two techniques

[Laura S. Johnson](#)^{a h} , [Mitchell Chaar](#)^{b h} , [Chad G. Ball](#)^{c h} , [Sebastian Perez](#)^h ,
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[David V. Feliciano](#)^{g h} , [Christopher J. Dente](#)^h 

- ▶ Studio randomizzato che valuta l'utilizzo della NPWT su fasciotomie che richiedono un reintervento
- ▶ La sutura standard della ferita consente una chiusura per prima intenzione nel 100% dei casi mentre la NPWT solamente nell'11%

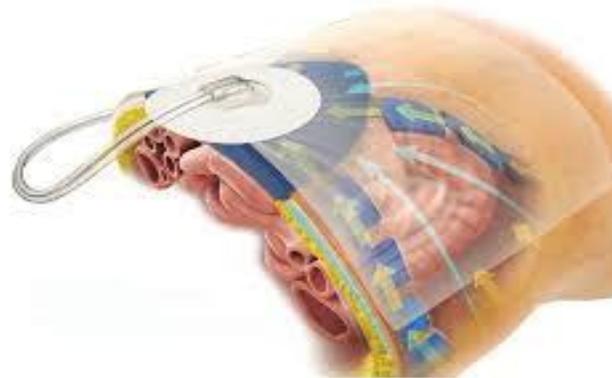
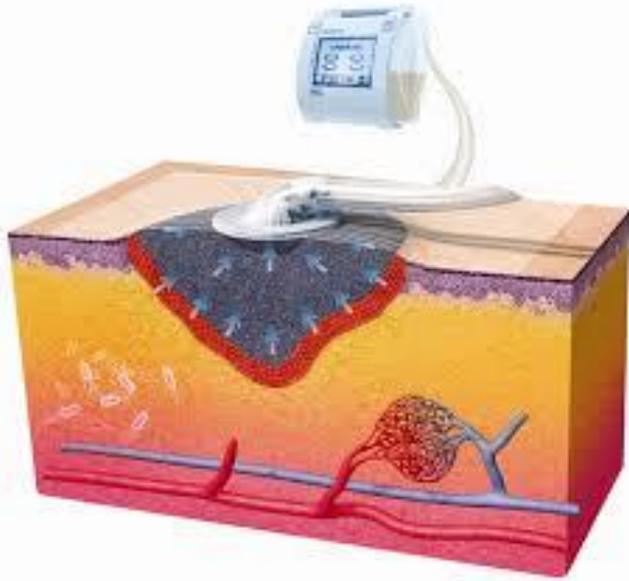
Management of Extremity Fasciotomy Sites - Evaluation of Two Techniques



LS Johnson et al, *AJS* 2018

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Conclusioni

Quando disponibile la NPWT è una opzione valida per consolidare una ferita chirurgica post ACS e nella gestione dell'OA

Visto il costo più elevato rispetto alle tecniche tradizionali e la disponibilità relativamente limitata non può essere considerata un gold standard nel trauma