

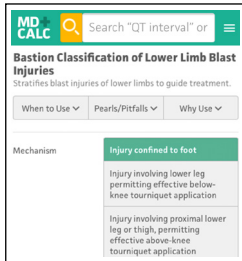


# Calculated Decisions

POWERED BY



Clinical Decision Support for *Emergency Medicine Practice* Subscribers



Click the thumbnail above to access the calculator.

## Bastion Classification of Lower Limb Blast Injuries

**Introduction:** The Bastion Classification criteria stratify explosion-related lower limb injuries into 5 categories to guide treatment.

### Points & Pearls

- The validation study of the Bastion Classification (Jacobs 2014) was not designed to correlate class of injury with outcomes such as mortality, transfusion requirements, or definitive amputation level.
- The Bastion Classification correlates better in blast injuries resulting in traumatic amputations than in segmental injuries.
- Because not all injuries involve complete traumatic amputation of a limb, this classification is supplemented by the suffix "S" to denote a segmental injury, defined as the presence of potentially viable tissue distal to the most proximal injury.
- Associated injuries to the intraperitoneal abdomen, genitalia and perineum, pelvic ring, and upper limbs are important in treatment and operative planning, so these are denoted by additional suffixes A through D, respectively.
- Prehospital application of a tourniquet can effectively obtain hemorrhage control. The study validating the Bastion Classification (Jacobs 2014) had 98 injuries requiring pneumatic tourniquets out of 179 injuries (55%). A recent study

### Why to Use

The Bastion Classification was developed as a classification system to comprehensively describe the injury pattern of lower extremities after blast injuries. It correlates with treatment need, such as the requirement for operative proximal vascular control or amputation level. The criteria are helpful for facilitating communication between clinicians and for operative management.

### When to Use

- Use the Bastion Classification for patients with lower extremity injuries after explosions resulting in complex blast wounds.
- The constellation of injuries may include blunt or crush injuries, traumatic amputations, and compartment syndrome, as well as associated neurologic, thoracic, gastrointestinal, and genitourinary injuries.

### Next Steps

Management depends on the injuries diagnosed. Using the Bastion Classification and its suffixes, emergency department physicians and trauma surgeons can anticipate the need for other surgical consultations and the resources required for treatment.

in 2017 by Scerbo et al reported that patients who presented without prehospital tourniquets received more transfusions in the first hour of arrival (55% vs. 34%,  $P = .02$ ) and had increased mortality from hemorrhagic shock (14% vs. 3%,  $P = .01$ ).

### CALCULATOR REVIEW AUTHORS

#### Jennie Kim, MD

Department of Surgery  
Maimonides Medical Center, Brooklyn, NY

#### Travis Polk, MD

Commander, Medical Corps, U.S. Navy  
Los Angeles County+USC Medical Center, Los Angeles, CA

## Evidence Appraisal

A panel of military surgeons, Jacobs et al, developed the Bastion Classification and performed a prospective validation study with 103 patients who sustained 179 lower limb injuries caused by improvised explosive devices treated at Camp Bastion, Afghanistan, from November 2010 to February 2011.

The primary aim of the proposed classification was to provide a pragmatic, comprehensive, and clinically relevant system to better facilitate the transfer of information. Currently existing lower limb injury classification systems fail to describe the complete injury pattern or correlate with management. The Internal Committee of the Red Cross classification is broad and does not provide information on the severity of injury. The Mangled Extremity Severity Score (MESS), Gustilo and Anderson, and Müller AO classifications do not provide information on injury level. The Müller AO classification also does not take into account soft tissue injury. The secondary aim of the study by Jacobs et al was to facilitate the assessment of interventions. The Bastion Classification did show a predictable association with the level of initial musculoskeletal debridement and/or amputation and the level of vascular control.

The original study was not designed to correlate class of injury with outcomes such as mortality, transfusion requirements, or definitive amputation level, and thus, this information is not provided in the publication nor in the conclusions made.

A study in 2013 by Lundy and Hobbs looked at 67 patients with 117 injured limbs caused by dismantled blast exposure. The authors noted that the Bastion Classification appeared to be predictive of initial musculoskeletal treatment but was less useful in predicting the need for proximal vascular control, especially in the most common Class 3 injuries. The original study by Jacobs et al showed that Class 3 injuries correlated with a higher rate of intra- or extraperitoneal iliac vessel control (23% of 83 Class 3 injured limbs without associated abdominal injuries) compared to the study by Lundy et al that only had 1 patient with a Class 3 injury without associated abdominal injury and 6 (5%) of

all injured limbs requiring iliac vessel control. The 2013 study does not comment on correlation of the Bastion Classification to mortality rates

## Use the Calculator Now

[Click here to access the calculator.](#)

## Calculator Creator

Neal Jacobs, MD

[Click here to read more about Dr. Jacobs.](#)

## References

### Original/Primary Reference

- Jacobs N, Rourke K, Rutherford J, et al. [Lower limb injuries caused by improvised explosive devices: proposed 'Bastion Classification' and prospective validation.](#) *Injury.* 2014;45(9):1422-1428.

### Validation Reference

- Lundy JB, Hobbs CM. ['Bastion Classification': evolution of experience mandates caution when considering using class as predictor for method of temporary vascular control.](#) *Injury.* 2013;44(11):1671-1672.

### Other References

- Scerbo MH, Holcomb JB, Taub E, et al. [The trauma center is too late: major limb trauma without a pre-hospital tourniquet has increased death from hemorrhagic shock.](#) *J Trauma Acute Care Surg.* 2017;83(6):1165-1172.
- Cannon JW, Hofmann LJ, Glasgow SC, et al. [Dismounted complex blast injuries: a comprehensive review of the modern combat experience.](#) *J Am Coll Surg.* 2016;223(4):652-664.e8.
- Coupland RM, Korver A. [Injuries from antipersonnel mines: the experience of the International Committee of the Red Cross.](#) *BMJ.* 1991;303(6816):15909-15912.
- Gustilo RB, Mendoza RM, Williams DN. [Problems in the management of type III \(severe\) open fractures: a new classification of type III open fractures.](#) *J Trauma.* 1984;24(8):742-746.
- Müller ME, Nazarian S, Koch P. [The Comprehensive Classification of Fractures of Long Bones.](#) Berlin: Springer-Verlag;1987.
- Brown KV, Ramasamy A, McLeod J, et al. [Predicting the need for early amputation in ballistic mangled extremity injuries.](#) *J Trauma.* 2009;66(4 Suppl):S93-97; discussion S97-98.

Copyright © MDCalc • Reprinted with permission.

This edition of *Calculated Decisions*, powered by MDCalc, is published as a supplement to *Emergency Medicine Practice* as an exclusive benefit to subscribers. *Calculated Decisions*

is the result of a collaboration between EB Medicine, publisher of *Emergency Medicine Practice*, and MD Aware, developer of MDCalc. Both companies are dedicated to providing evidence-based clinical decision-making support for emergency medicine clinicians.



#### Contact EB Medicine:

Phone: 1-800-249-5770  
or 678-366-7933

Fax: 770-500-1316

Address:

5550 Triangle Parkway, Suite 150  
Norcross, GA 30092



#### Contact MD Aware:

MDCalc

Phone: 646-543-8380

Address:

902 Broadway, 6th Floor  
New York, NY 10010

*Emergency Medicine Practice* (ISSN Print: 1524-1971, ISSN Online: 1559-3908, ACID-FREE) is published monthly (12 times per year) by EB Medicine (5550 Triangle Parkway, Suite 150, Norcross, GA 30092). Opinions expressed are not necessarily those of this publication. Mention of products or services does not constitute endorsement. This publication is intended as a general guide and is intended to supplement, rather than substitute, professional judgment. It covers a highly technical and complex subject and should not be used for making specific medical decisions. The materials contained herein are not intended to establish policy, procedure, or standard of care. Copyright © 2018 EB Medicine. All rights reserved. No part of this publication may be reproduced in any format without written consent of EB Medicine. This publication is intended for the use of the individual subscriber only and may not be copied in whole or part or redistributed in any way without the publisher's prior written permission.