

Comparison of Abdominal Damage Control Surgery in Combat vs Civilian Trauma

CN Sambasivan¹, SJ Underwood¹, SD Cho¹, L Kiraly¹, GJ Hamilton¹, T Kofoed¹, SF Flaherty², WC Dorlac², MA Schreiber¹

¹Oregon Health & Science University, Portland, Oregon ²Landstuhl Regional Medical Center, Landstuhl, Germany

Introduction

Civilian Setting:

- One or two regional locations
- Optimal resources
- Blunt mechanisms of injury

Military Setting and Objective:

- Multi-level international evacuation system
- Austere conditions or mass casualty situations
 - Maximize resources
 - Limit operative time
- Primarily blast injuries

Objectives

- Compare characteristics and management of abdominal damage control surgery in two very different settings
 - Civilian population (CP) at a US level 1 trauma center
 - Military population (MP) in the combat setting

Primary Outcome

Abdominal closure

Secondary Outcomes

Total number of procedures
Mortality



Hypothesis

- MP at the time of transfer to CONUS are:
 - More likely to require an increased number of procedures
 - More likely to remain with an open abdomen
 - Unlikely to differ in mortality compared to the CP

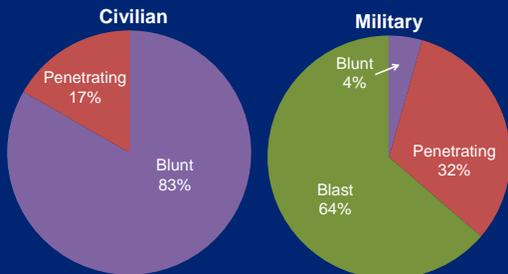
Methods

- Parallel retrospective chart reviews (2005-2006)
 - Oregon Health & Science University in Portland, OR
 - Landstuhl Regional Medical Center in Germany
- Patient characteristics, mechanism of injury, treatment course, and complications were compared over the first 7 days following injury and management with an open abdomen
- ~ 75% of MP were transferred to CONUS within 7 days
 - These patients made up the study group
 - Correspondingly, the first 7 days of civilian hospitalization were used as a comparator

Results

- Data were obtained from trauma patients managed with an open abdomen
 - 30 Civilian patients (CP)
 - 113 Military patients (MP)
- CP are older, have higher Injury Severity Score (ISS), a larger base deficit (BD) and a trend toward a higher International Normalized Ratio (INR).
- MP undergo greater percentage of chest and skin/plastics procedures.
- Overall percentage of complications between populations not significantly different.

Mechanism of Injury



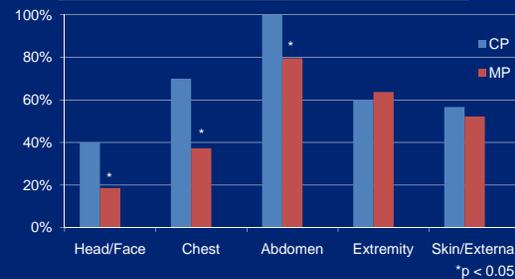
Initial Patient Characteristics

	CP (n = 30)	MP (n = 113)	p-value
Age ¹	40.0 (24.5-54.8)	23.0 (21.0-28.0)	< 0.01
Male gender ³	63.3%	99.1%	<0.01
ISS (Injury Severity Score) ²	34.5 ± 12.0	26.9 ± 14.3	0.01
GCS (Glasgow Coma Score) ¹	13 (3-15)	9 (3-10)	0.25
SBP (Systolic Blood Pressure) ²	108 ± 30	126 ± 20	< 0.01
Pulse ²	110 ± 29	102 ± 23	0.13
Hematocrit ²	33.3 ± 6.7	34.7 ± 7.5	0.36
Platelet ²	186 ± 91	160 ± 79	0.14
INR (International Normalized Ratio) ¹	1.4 (1.2-2.0)	1.3 (1.1-1.7)	0.05
BD (Base Deficit) ²	9.8 ± 6.2	6.5 ± 6.3	0.02

¹Median (inter-quartile range)—Mann-Whitney U
²Mean ± standard deviation—Student's t-test
³Chi-square test

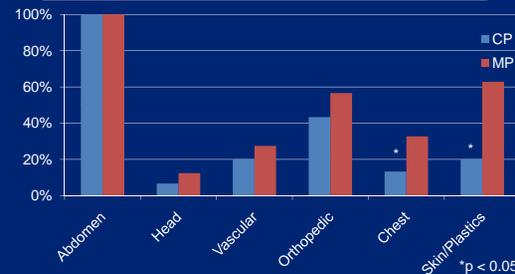
AIS Regions Injured

	CP	MP	p-value
Total # AIS regions injured	3.3 ± 1.2	2.5 ± 1.0	< 0.01



Regions Operated Upon

	CP	MP	p-value
Total # regions operated upon	2.0 ± 0.96	2.9 ± 1.1	< 0.01



Distribution of Intra-abdominal Injuries

Region (%)	CP	MP	p-value
No injury	6.7	14.2	0.36
Liver	50.0	26.5	< 0.01
Spleen	23.3	26.5	0.72
Small bowel	20.0	37.2	0.08
Colon	16.7	49.6	< 0.01
Kidney	30.0	14.2	0.04
Pancreas	10.0	11.5	1.0
Mesentery	33.3	4.4	< 0.01
Vessels	16.7	17.7	0.90
Stomach	6.7	8.0	1.0
Urinary system	13.3	5.4	0.22

Outcomes

	CP	MP	p-value
Total number of procedures	2.9 ± 1.3	3.5 ± 1.3	0.02
Abdomen closed	70.0%	48.7%	0.11
Mortality	0%	0.90%	1.0

Complications

	CP	MP	p-value
Overall	43.3	58.4	0.14
Pneumonia	33.3	3.5	< 0.01
Respiratory Complications	13.3	0	< 0.01
Technical Complications	13.3	19.5	0.60
Missed Injury	6.7	15.9	0.25
Infection	0	9.7	0.12
Acute Renal Failure	10.0	18.6	0.41
Rhabdomyolysis	6.7	3.5	0.61

Conclusions

- Civilian and military trauma patients who undergo damage control surgery differ at baseline in terms of demographics and mechanism of injury.
- Over the same time period:
 - Abdominal closure rates were not significantly different
 - MP required an increased number of operations
 - Mortality and complication rates are similar

