Trauma Challenges in the Obese Population

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BARIATRIC SURGERY CENTER™
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Our Bariatric Team:

MBS Surgeons

Fredric Pieracci, MD, MPH
MBS Director

Alex Morton, MD
MBS Associate Director

Coming soon

Surgeon #3

Ann Kulungowski, MD
Adolescent Bariatric Director

Program Coordinator

Leigh Rieder, RN

Advanced Practice Providers

Mollie Nardecchia, PA-C

Cassidy Thomas, PA-C

Psychologists

Alison Lieberman, PsyD

Maria Boero-Legge, PhD

Dieticians

Tammy Vigil, RD
Lead Bariatric Dietician

Tara Gray, RD
Adult & Adolescent Dietician

Amanda Petro
Bariatric Dietician

Administrative and Research Support

Elizabeth Hill
Admin Support

Desiree Rivera
Admin Support

Sophia Quesada
Research Associate

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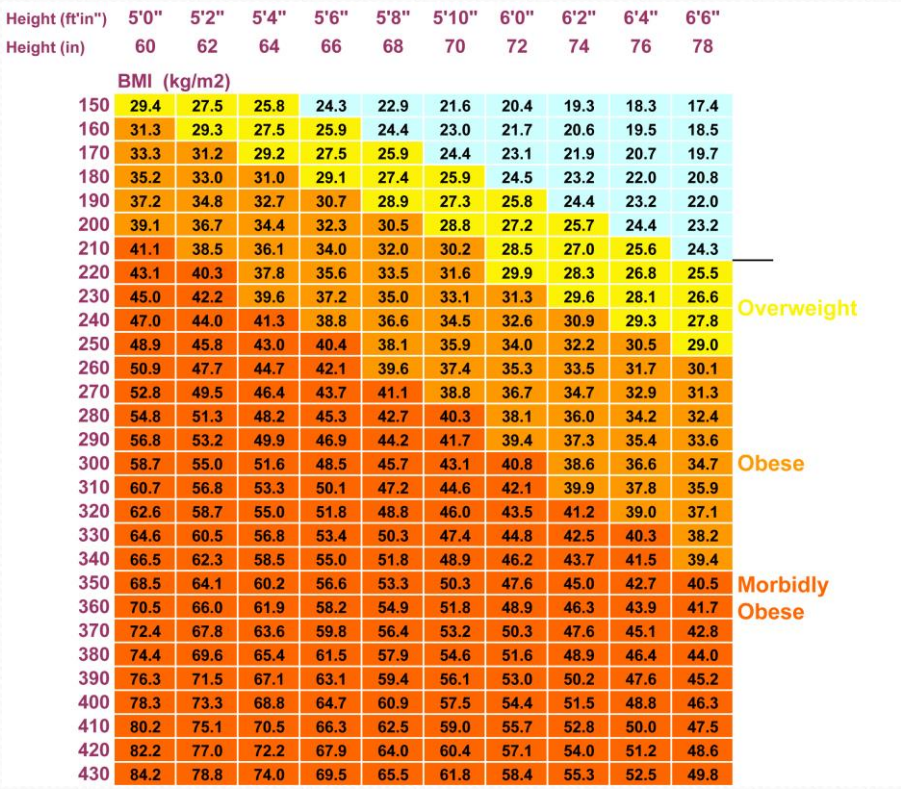
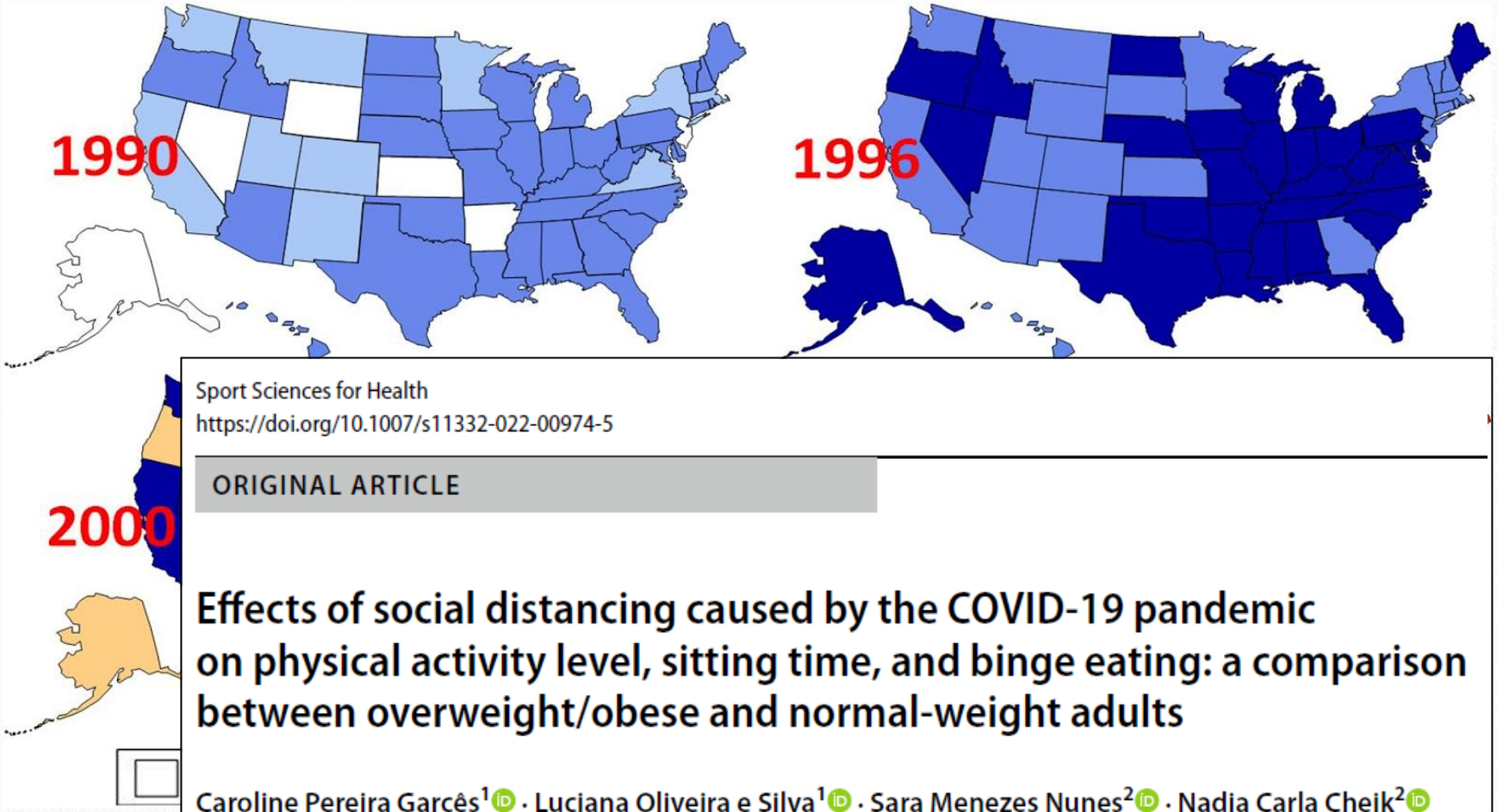
Outline

- Physiologic changes associated with obesity
- Specific trauma situations:
  - Airway
  - Invasive Procedures
  - Penetrating abdominal trauma
  - Rhabdomyolysis



Height (ft'in")	5'0"	5'2"	5'4"	5'6"	5'8"	5'10"	6'0"	6'2"	6'4"	6'6"	
Height (in)	60	62	64	66	68	70	72	74	76	78	
BMI (kg/m2)											
150	29.4	27.5	25.8	24.3	22.9	21.6	20.4	19.3	18.3	17.4	
160	31.3	29.3	27.5	25.9	24.4	23.0	21.7	20.6	19.5	18.5	
170	33.3	31.2	29.2	27.5	25.9	24.4	23.1	21.9	20.7	19.7	
180	35.2	33.0	31.0	29.1	27.4	25.9	24.5	23.2	22.0	20.8	
190	37.2	34.8	32.7	30.7	28.9	27.3	25.8	24.4	23.2	22.0	
200	39.1	36.7	34.4	32.3	30.5	28.8	27.2	25.7	24.4	23.2	
210	41.1	38.5	36.1	34.0	32.0	30.2	28.5	27.0	25.6	24.3	
220	43.1	40.3	37.8	35.6	33.5	31.6	29.9	28.3	26.8	25.5	
230	45.0	42.2	39.6	37.2	35.0	33.1	31.3	29.6	28.1	26.6	Overweight
240	47.0	44.0	41.3	38.8	36.6	34.5	32.6	30.9	29.3	27.8	
250	48.9	45.8	43.0	40.4	38.1	35.9	34.0	32.2	30.5	29.0	
260	50.9	47.7	44.7	42.1	39.6	37.4	35.3	33.5	31.7	30.1	
270	52.8	49.5	46.4	43.7	41.1	38.8	36.7	34.7	32.9	31.3	
280	54.8	51.3	48.2	45.3	42.7	40.3	38.1	36.0	34.2	32.4	
290	56.8	53.2	49.9	46.9	44.2	41.7	39.4	37.3	35.4	33.6	
300	58.7	55.0	51.6	48.5	45.7	43.1	40.8	38.6	36.6	34.7	Obese
310	60.7	56.8	53.3	50.1	47.2	44.6	42.1	39.9	37.8	35.9	
320	62.6	58.7	55.0	51.8	48.8	46.0	43.5	41.2	39.0	37.1	
330	64.6	60.5	56.8	53.4	50.3	47.4	44.8	42.5	40.3	38.2	
340	66.5	62.3	58.5	55.0	51.8	48.9	46.2	43.7	41.5	39.4	
350	68.5	64.1	60.2	56.6	53.3	50.3	47.6	45.0	42.7	40.5	Morbidly
360	70.5	66.0	61.9	58.2	54.9	51.8	48.9	46.3	43.9	41.7	Obese
370	72.4	67.8	63.6	59.8	56.4	53.2	50.3	47.6	45.1	42.8	
380	74.4	69.6	65.4	61.5	57.9	54.6	51.6	48.9	46.4	44.0	
390	76.3	71.5	67.1	63.1	59.4	56.1	53.0	50.2	47.6	45.2	
400	78.3	73.3	68.8	64.7	60.9	57.5	54.4	51.5	48.8	46.3	
410	80.2	75.1	70.5	66.3	62.5	59.0	55.7	52.8	50.0	47.5	
420	82.2	77.0	72.2	67.9	64.0	60.4	57.1	54.0	51.2	48.6	
430	84.2	78.8	74.0	69.5	65.5	61.8	58.4	55.3	52.5	49.8	

The Obesity Epidemic Over Time



Sport Sciences for Health
https://doi.org/10.1007/s11332-022-00974-5

ORIGINAL ARTICLE

Effects of social distancing caused by the COVID-19 pandemic on physical activity level, sitting time, and binge eating: a comparison between overweight/obese and normal-weight adults

Caroline Pereira Garcês[1] · Luciana Oliveira e Silva[1] · Sara Menezes Nunes[2] · Nadia Carla Cheik[2]

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Concise Definitive Review — R. Phillip Dellinger, MD, FCCM, Section Editor

Critical care of the bariatric patient

Fredric M. Pieracci, MD; Philip S. Barie, MD, MBA, FCCM; Alfons Pomp, MD

- Adipose tissue is highly metabolically active
  - pro inflammatory
  - hypercoagulable
- Altered pharmokinetics
  - ABW vs. IBW
- Excess adipose tissue impairs procedures
- Increased overall weight
  - Equipment limitations
  - Pressure induced pathology
    - Rhabdomyolysis
    - Compartment syndrome

Table 2. Major organ-system derangements in obesity

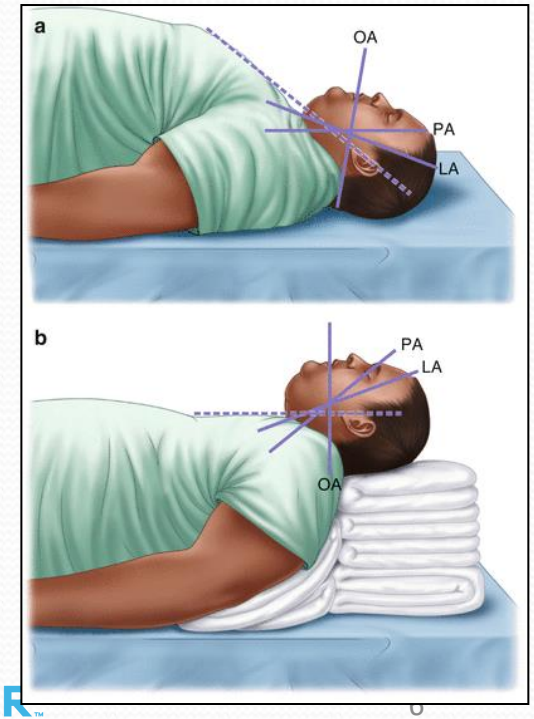
Organ System	Pathology
Respiratory	↓ FRC, TLC, VC, IC, ERV ↑ FEV_1/FVC Obstructive sleep apnea syndrome
Cardiovascular	↑ Blood volume ↑ Vascular tone ↓ Ventricular contractility
Renal	↑ Clearance of renally excreted drugs Hypertensive and diabetic nephropathy
Hematologic	↑ Fibrinogen ↑ PAI-1 ↓ AT-III Venous stasis
Gastrointestinal	Hiatal hernia ↑ Gastric secretion volume ↓ Gastric pH
Metabolic/Endocrine	↑ Resting energy expenditure Insulin resistance ↑ Proteolysis
Immunologic	↑ TNF-α ↑ IL-6 Impaired neutrophil function

Airway Considerations

- *Issues*
  - Obstructive sleep apnea (OSA)
  - Difficult mask ventilation (may need three people)
  - Reduced FRC
  - Increased susceptibility to respiratory depressant effect of anesthetic drugs

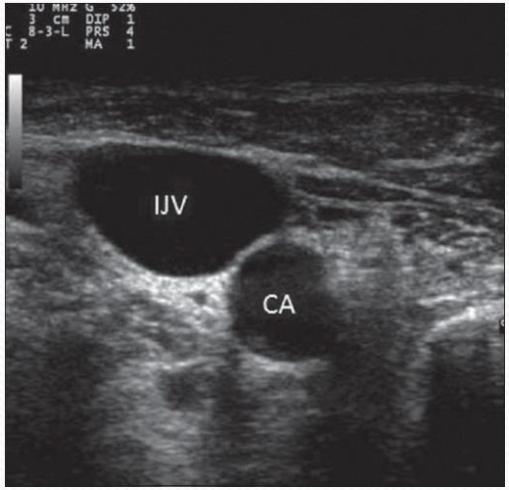
- *Strategies*
  - Pre-oxygentation (high flow nasal cannula during RSI)
  - Positioning (ramp)

- *Adjuncts*
  - Video laryngoscopy
  - Fiberoptic bronchoscopy
  - Percutaenous tracheostomy



Invasive Procedures

- Central Venous Cannulation
  - Ultrasound guidance mandatory
  - Internal jugular position preferred
  - Cutdown may be necessary
  - Ensure adequate equipment length
- Tracheostomy
  - Percutaneous preferred over open
- Chest tube
  - Percutaneous preferred over surgical
  - Make bigger incision for surgical
  - Lower threshold for VATS



Original Research Article

Beyond the tube: Can we reduce chest tube complications in trauma patients?

Carson Platnick [a, *], Cordelie E. Witt [a, b], Fredric M. Pieracci [a], Caitlin K. Robinson [a], Ryan Lawless [a], Clay Cothren Burlew [a], Ernest E. Moore [a], Mitchell Cohen [a], K. Barry Platnick [a]

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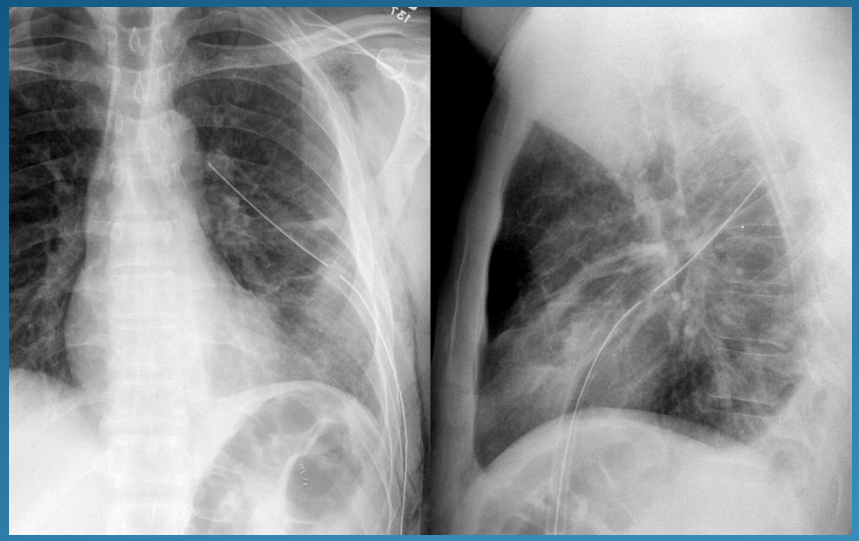
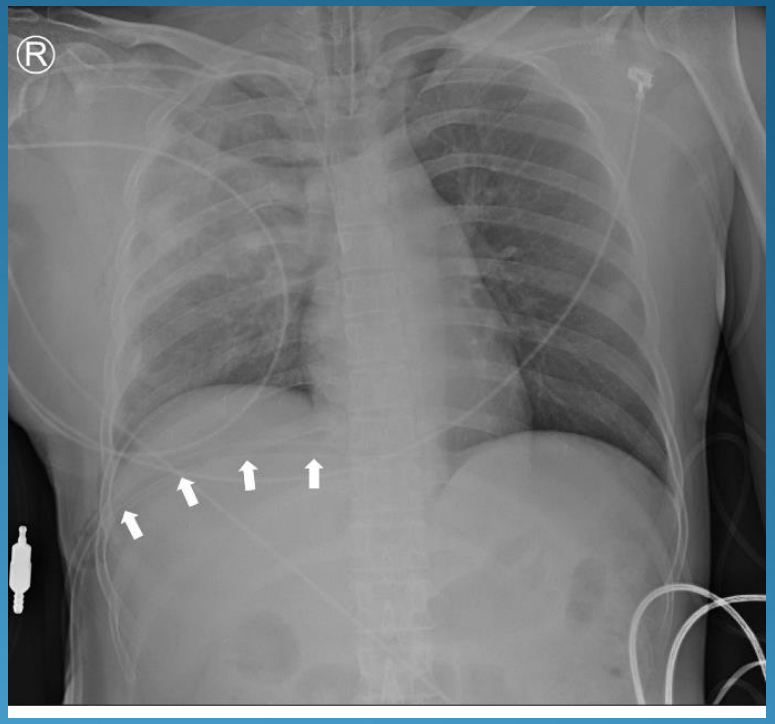
[b] University of Colorado School of Medicine, 13001 East 17th Place Aurora, CO 80045, USA

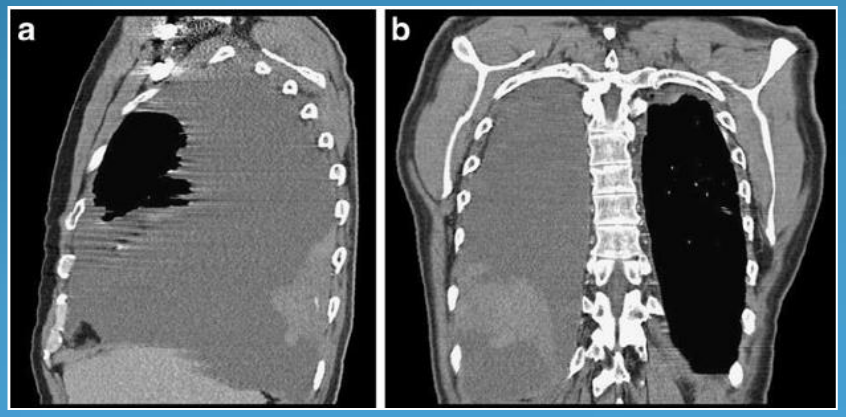
Multivariable logistic regression.

Variable	Odds ratio	95% CI		p
BMI >30 kg/m^2	2.57	1.43	4.61	<0.01
Time from admission to TT	0.99	0.97	1.00	0.70
Overnight placement	1.61	1.00	2.60	0.05
Inserted in ED	2.18	1.29	3.67	<0.01
Inserted by EM operator	2.42	1.37	4.27	<0.01
Inserted by resident	0.74	0.39	1.40	0.35

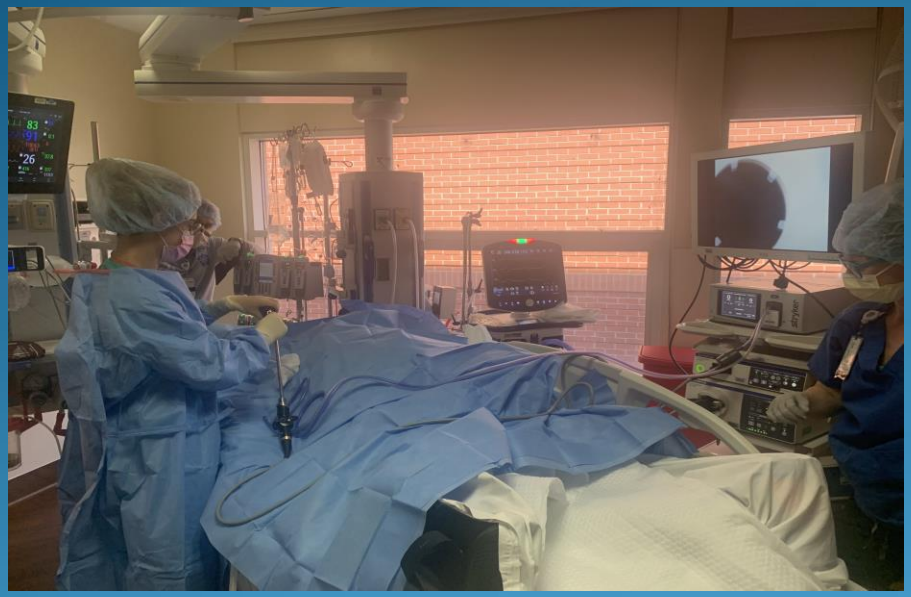
Chest Tube Misadventures







Bedside VATS-assisted tube thoracostomy

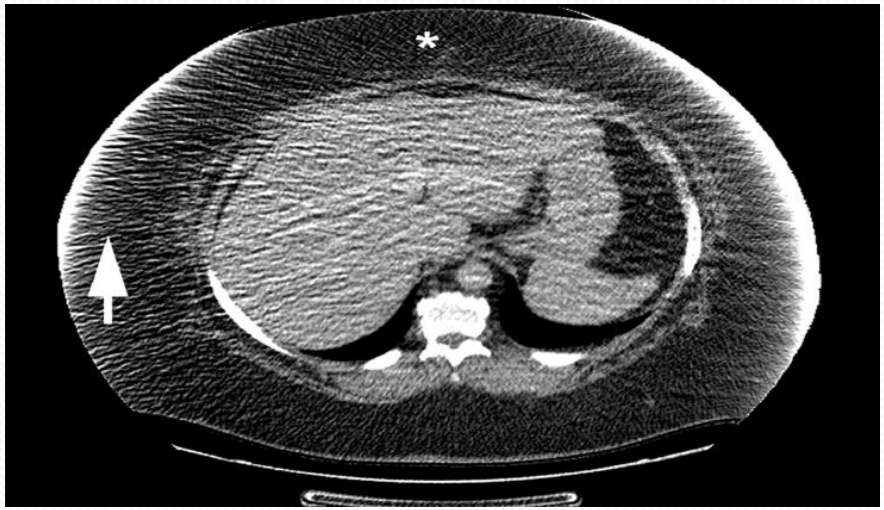


Pleural insufflation

- Entry via Opti-view technique
- Insufflation pressure 8-12 mm Hg
- Hypercarbia possible; usually inconsequential
- Avoid tunneling into sub-Q space

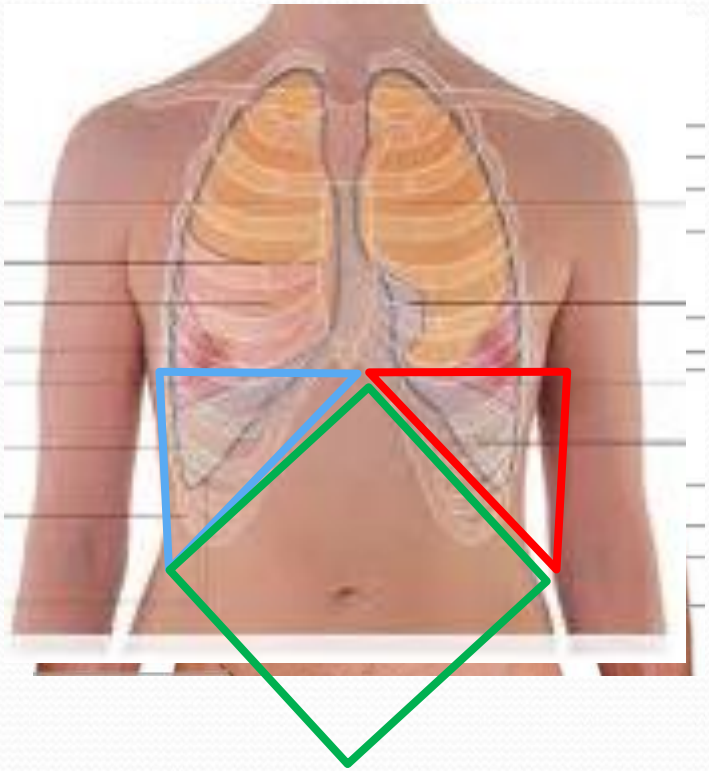
Penetrating Trauma

- Increased adipose tissue external to body cavities decreases the likelihood of injury requiring surgical management
- This lends itself to more liberal use of non operative strategies
- However, peritonitis is masked in the obese patient population



Anterior Abdominal Stab Wounds

Anatomic Regions



1. ANTERIOR ABDOMEN
2. LEFT THORACOABDOMEN
3. RIGHT THORACOABDOMEN
4. FLANK/BACK

Management Pathways

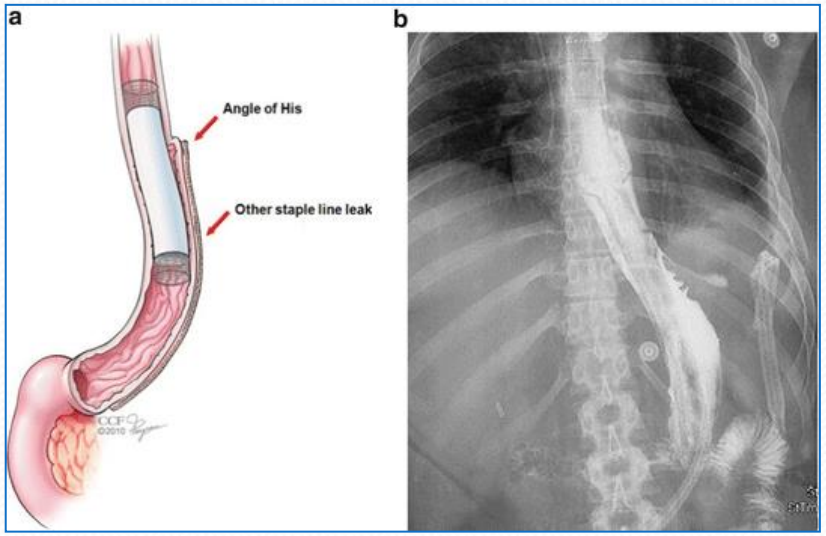
penetrating abdominal injuries

Mechanism	ANTERIOR ABDOMEN	L THORACO-ABDOMEN	R THORACO-ABDOMEN	BACK/FLANK
BMI < 40 kg/m2				
GSW	Laparotomy	Laparotomy	Observe	CT
STAB WOUND	Local wound exploration - observe	Local wound exploration - laparoscopy	Local wound exploration - observe	CT
BMI ≥ 40 kg/m2				
GSW	CT	Laparoscopy	Observe	CT
STAB WOUND	Observe	Laparoscopy	Observe	CT

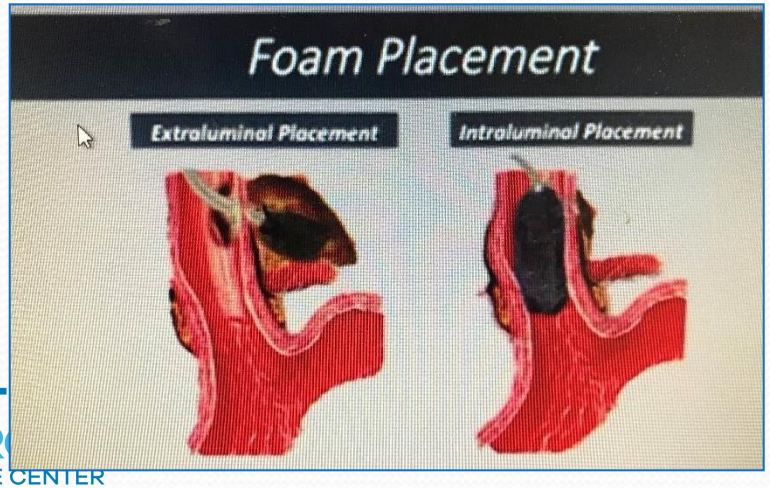
A New Field of Trauma Surgical Endoscopy

- In stable patients with source control (percutaneous and/or surgical), endoscopic control of perforations has become increasingly popular
- This is particularly advantageous in severely obese patients.
- Endoscopic vs. operative should be a carefully considered, individualized decision, based upon patient physiology and leak location/size

Endoluminal stent



eVAC Therapy



Pressure-induced Rhabdomyolysis

- Setting:
  - Prolonged immobility
  - Intra-operative time/positioning
- Risks factors:
  - Male
  - BMI > 50 kg/m^2,
- Presents with myalgias, oliguria, myoglobinuria, elevated serum CPK
- Treatment:
  - Hydration
  - Dialysis

Summary

- Set yourself up for success by having appropriately sized equipment – think of obesity as a unique subset like pediatrics
- Prioritize staff safety by always having extra people around.
- Incorporate the severely obese patient into your checklists, drills, simulations, quality initiatives, and research.

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