Visioconférence “Au coeur de la trauma”

Les traumatismes abdominaux pédiatriques

27 mai 2015

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Plan de la présentation

- Introduction
- Prise en charge initiale
- Investigations radiologiques
- Trauma hépatique & splénique
- Trauma rénal
- Trauma du carrefour pancréatico-duodénal
- Conclusions

Introduction

- 8 à 12% des enfants avec trauma contondant ont un trauma abdominal
- Taux de survie de plus de 90%
- Les traumas abdo sont 30% plus communs que les trauma thoraciques, mais 40% moins léthal

Introduction

Table 14-3 Incidence and Mortality of Injuries to Thoracic and Abdominal Organs

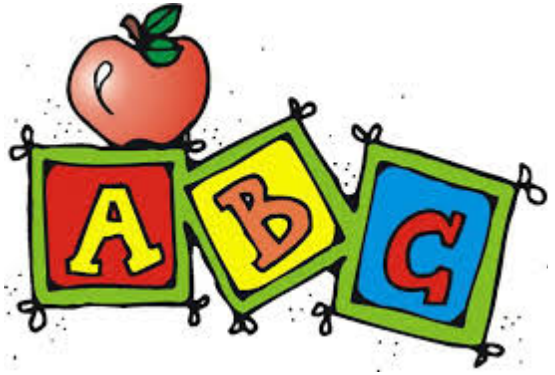
	Incidence (%)	Mortality (%)
Abdominal Organ		
Liver	27	13
Spleen	27	11
Kidneys	25	13
Gastrointestinal tract	21	11
Great vessels	5	47
Genitourinary tract	5	3
Pancreas	4	7
Pelvis	<1	7

From Cooper A, Barlow B, DiScala C, et al: Mortality and truncal injury: The pediatric perspective. J Pediatric Surg 29:33-38, 1994.

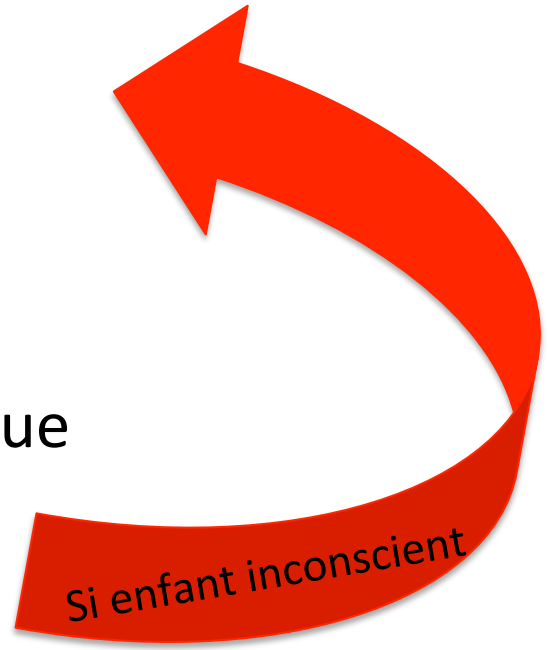
Introduction

- L'abdomen d'un enfant est plus susceptible d'être traumatisé
  - Côtes flexibles et recouvrant seulement l'abdomen supérieur
  - Muscles, graisses et aponévroses minces
  - Pelvis peu profond remontant la vessie dans l'abdomen
  - Abdomen plus petit et recevant la force de l'impact réparti sur plusieurs organes

Prise en charge initiale



- Airway
  - Toujours assumer une lésion de la colonne cervicale jusqu'à preuve du contraire
  - Dégager les voies respiratoires
  - Ventilation
- Breathing
  - Oxygénation
  - R/O PNTX, hémothorax, volet thoracique
- Circulation
  - Pouls, signes de choc, tamponnade
- Disability (GCS, pupilles)
- Exposure

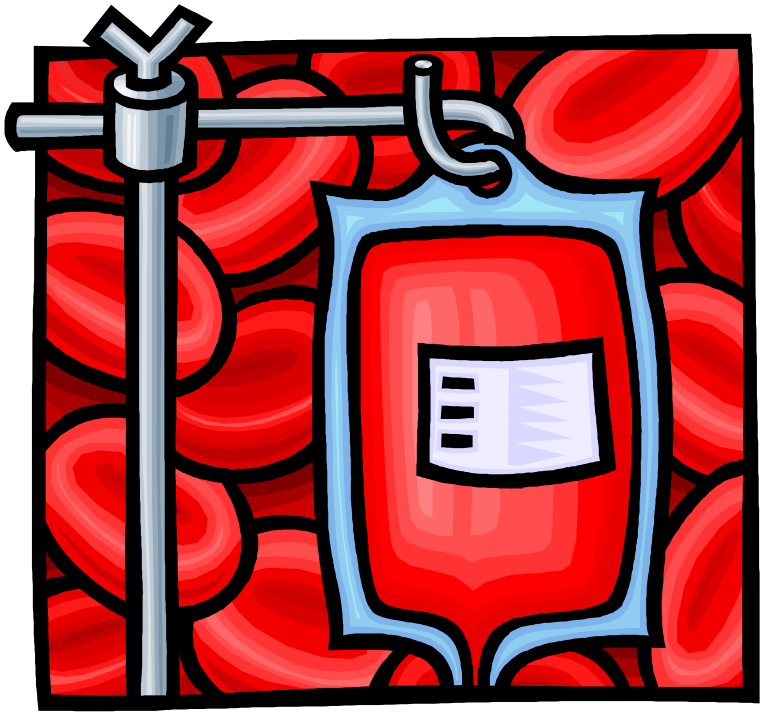


Prise en charge initiale

- Examen secondaire
- FAST
- Rx poumon, +/-Rx latéral colonne cervicale, +/- Rx bassin

Prise en charge initiale

- La première cause de choc en trauma pédiatrique est:
  - L'HÉMORRAGIE



À retenir!

- Les enfants peuvent perdre jusqu'à 30-40% de leur volume sanguin avant que la pression soit affectée
- Les enfants peuvent être en CHOC avec une pression artérielle normale

Réanimation

- Comment calculer le volume sanguin d'un enfant?

80 cc/kg

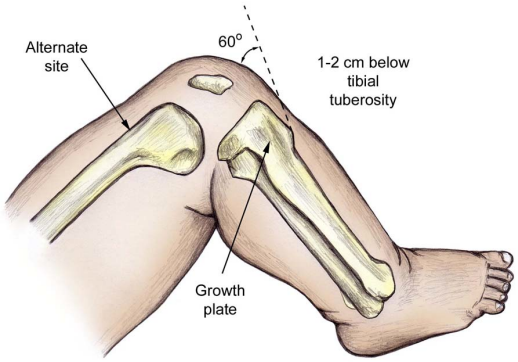
Calcul 101

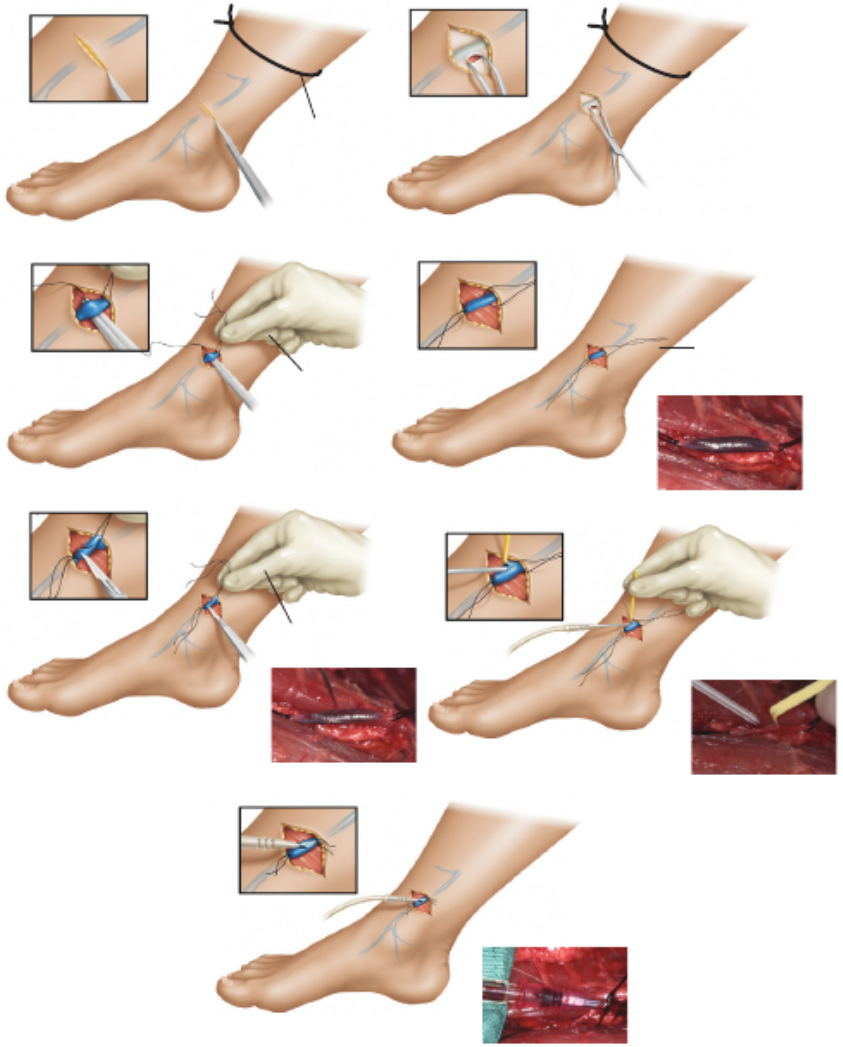
- Perte sanguine pouvant mener au CHOC chez un enfant de 15 kg?

360 cc représente 30% du volume sanguin d'un enfant de 15 kg

Accès veineux chez l'enfant

- Accès IV périphériques x2
- Accès intra-osseux
- Voie veineuse centrale
- Venous cutdown (veine saphène distale)





Réanimation liquidienne

- Cristalloïdes
  - 20 cc/kg, répéter ad 2 fois
- Considérer transfusions de façon précoce
  - Toujours demander crossmatch et sang en réserve
  - O négatif vs. sang groupé-croisé
  - Transfusion 10 cc/kg
  - Penser au protocole d'hémorragie massive

Investigations radiologiques

Les CT scans en augmentation constante

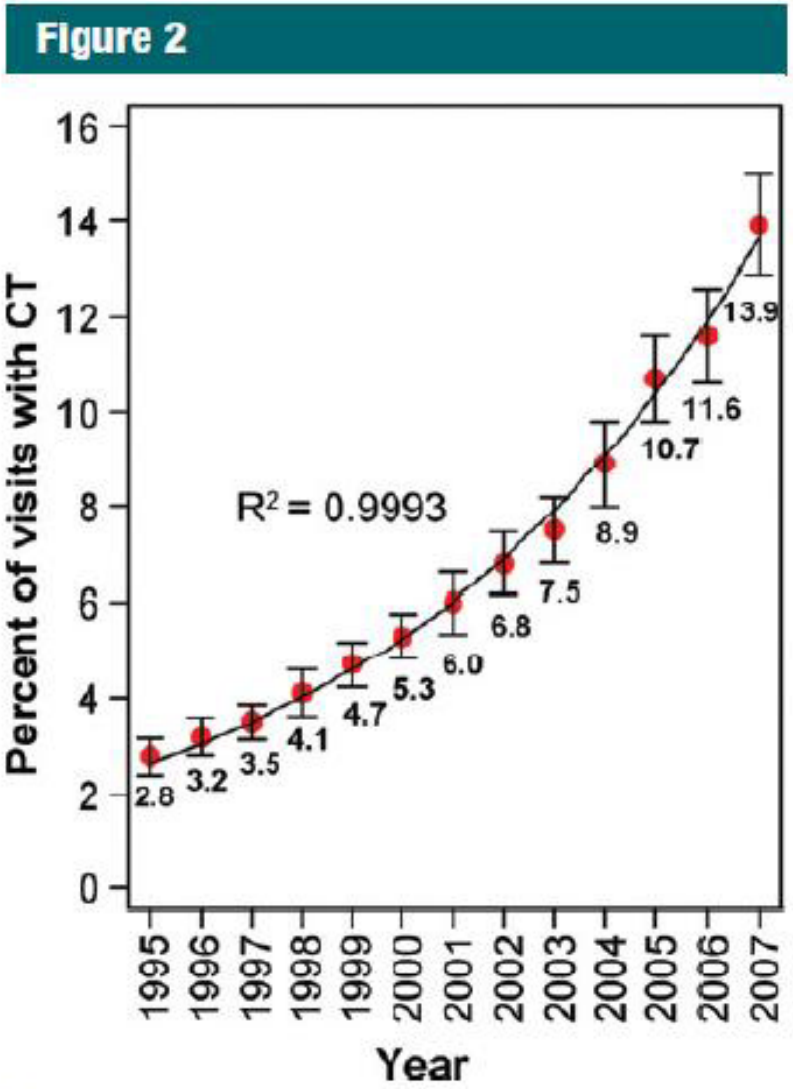


Figure 2: Graph illustrates percentages of ED visits involving CT from 1995 to 2007. Data points indicate national estimates of percentages of ED visits involving CT based on the sample data. Solid line = exponential model based on the data. Error bars = 95% confidence intervals.

Larson et al., Radiology 2011

Investigations radiologiques

- Le CT scan abdomino-pelvien avec contraste IV demeure le gold-standard
  - Plus sensible pour les organes solides
  - Moins sensibles pour viscères creux et diaphragme
  - Contraste IV essentiel, contraste entéral demeure controversé (mais ne peut exclure hors de tout doute un trauma de viscère creux)
- Mais à qui doit-on faire un CT scan?

Identifying Children at Very Low Risk of Clinically Important Blunt Abdominal Injuries

James F. Holmes, MD, MPH; Kathleen Lillis, MD; David Monroe, MD; Dominic Borgialli, DO, MPH; Benjamin T. Kerrey, MD; Prashant Mahajan, MD, MPH; Kathleen Adelgais, MD, MPH; Angela M. Ellison, MD, MSc; Kenneth Yen, MD, MS; Shireen Atabaki, MD, MPH; Jay Menaker, MD; Bema Bonsu, MD; Kimberly S. Quayle, MD; Madelyn Garcia, MD; Alexander Rogers, MD; Stephen Blumberg, MD; Lois Lee, MD, MPH; Michael Tunik, MD; Joshua Kooistra, DO; Maria Kwok, MD; Lawrence J. Cook, PhD; J. Michael Dean, MD, MBA; Peter E. Sokolove, MD; David H. Wisner, MD; Peter Ehrlich, MD; Arthur Cooper, MD, MS; Peter S. Dayan, MD, MSc; Sandra Wootton-Gorges, MD; Nathan Kuppermann, MD, MPH; for the Pediatric Emergency Care Applied Research Network (PECARN)*

Study objective: We derive a prediction rule to identify children at very low risk for intra-abdominal injuries undergoing acute intervention and for whom computed tomography (CT) could be obviated.

Methods: We prospectively enrolled children with blunt torso trauma in 20 emergency departments. We used binary recursive partitioning to create a prediction rule to identify children at very low risk of intra-abdominal injuries undergoing acute intervention (therapeutic laparotomy, angiographic embolization, blood transfusion for abdominal hemorrhage, or intravenous fluid for ≥2 nights for pancreatic/gastrointestinal injuries). We considered only historical and physical examination variables with acceptable interrater reliability.

Results: We enrolled 12,044 children with a median age of 11.1 years (interquartile range 5.8, 15.1 years). Of the 761 (6.3%) children with intra-abdominal injuries, 203 (26.7%) received acute interventions. The prediction rule consisted of (in descending order of importance) no evidence of abdominal wall trauma or seat belt sign, Glasgow Coma Scale score greater than 13, no abdominal tenderness, no evidence of thoracic wall trauma, no complaints of abdominal pain, no decreased breath sounds, and no vomiting. The rule had a negative predictive value of 5,028 of 5,034 (99.9%; 95% confidence interval [CI] 99.7% to 100%), sensitivity of 197 of 203 (97%; 95% CI 94% to 99%), specificity of 5,028 of 11,841 (42.5%; 95% CI 41.6% to 43.4%), and negative likelihood ratio of 0.07 (95% CI 0.03 to 0.15).

Conclusion: A prediction rule consisting of 7 patient history and physical examination findings, and without laboratory or ultrasonographic information, identifies children with blunt torso trauma who are at very low risk for intra-abdominal injury undergoing acute intervention. These findings require external validation before implementation. [Ann Emerg Med. 2013;62:107-116.]

Identifying Children at Very Low Risk of Clinically Important Blunt Abdominal Injuries

- Étude prospective multicentrique (groupe PECARN), 2007-2010
- Enfants avec trauma contondant thoracique ou abdo moins de 24h avant l'évaluation
- Cuillette de données avant le CT scan, CT scan selon le jugement de l'urgentologue
- Outcome principal: trauma intra-abdo nécessitant une intervention aigue (mort, chirurgie, embolisation, transfusion, séjour de >1 jour nécessitant réanimation liquidienne

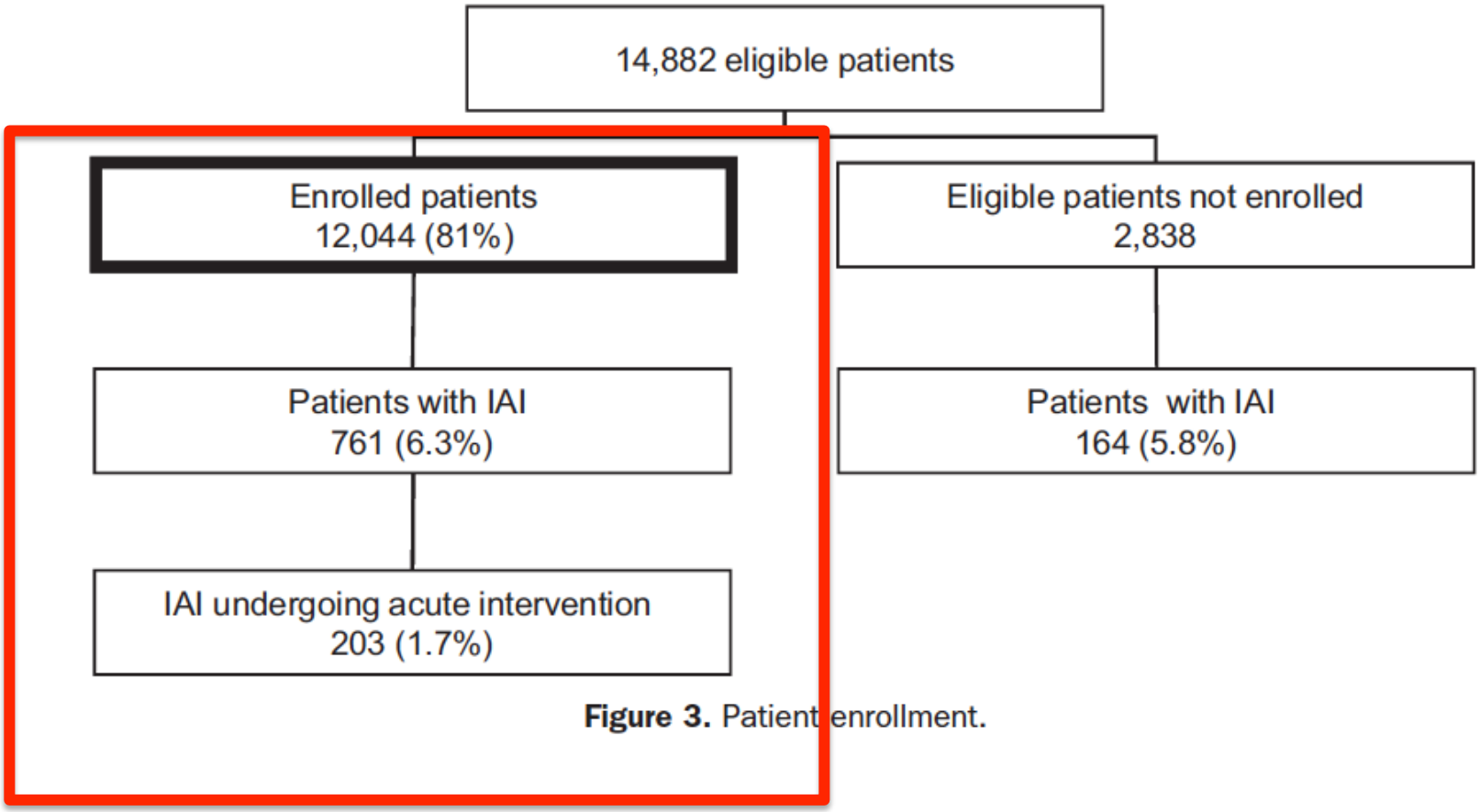
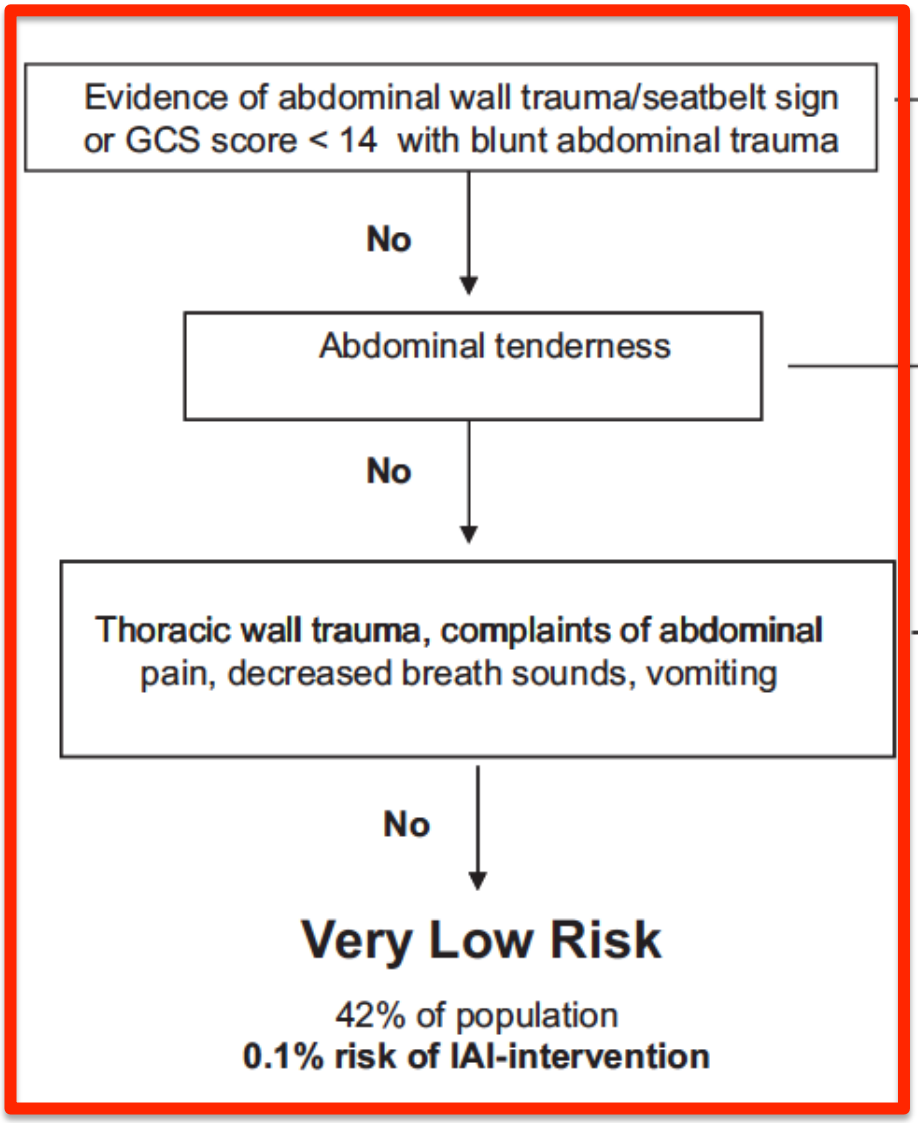


Figure 3. Patient enrollment.

Identifying Children at Very Low Risk of Clinically Important Blunt Abdominal Injuries



	Percent (95% CI)
Prediction rule sensitivity	97.0% (93.7, 98.9)
Prediction rule specificity	42.5% (41.6, 43.4)
Negative predictive value	99.9% (99.7, 1.00)
Positive predictive value	2.8% (2.4, 3.2)
Negative likelihood ratio	0.07 (0.03, 0.15)

Figure 5. Clinical risk stratification of children with blunt torso trauma.

Identifying Children at Very Low Risk of Clinically Important Blunt Abdominal Injuries

- Attention, tous les enfants présentant un des 7 facteurs prédicteurs ne doivent pas nécessairement avoir un CT scan

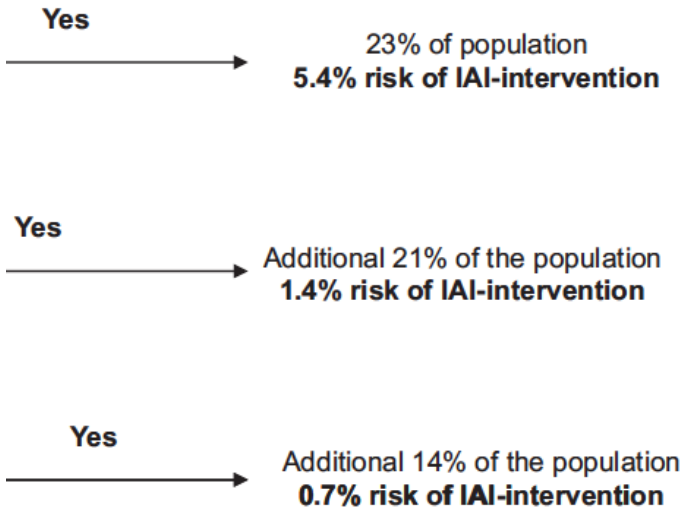


Table 2. Risk of IAI undergoing acute intervention according to the number of prediction rule variables present.

Number of Variables Present	Patients (%)	IAI Acute Intervention	% (95% CI)
0	5,040 (41.9)	6	0.1 (0.04–0.3)
1	2,679 (22.2)	37	1.4 (1.0–1.9)
2	2,576 (21.4)	47	1.8 (1.3–2.4)
3	1,280 (10.6)	57	4.5 (3.4–5.7)
4 or more	469 (3.9)	56	11.9 (9.2–15.2)

Investigations radiologiques

- Peu de littérature sur l'utilisation de l'écho

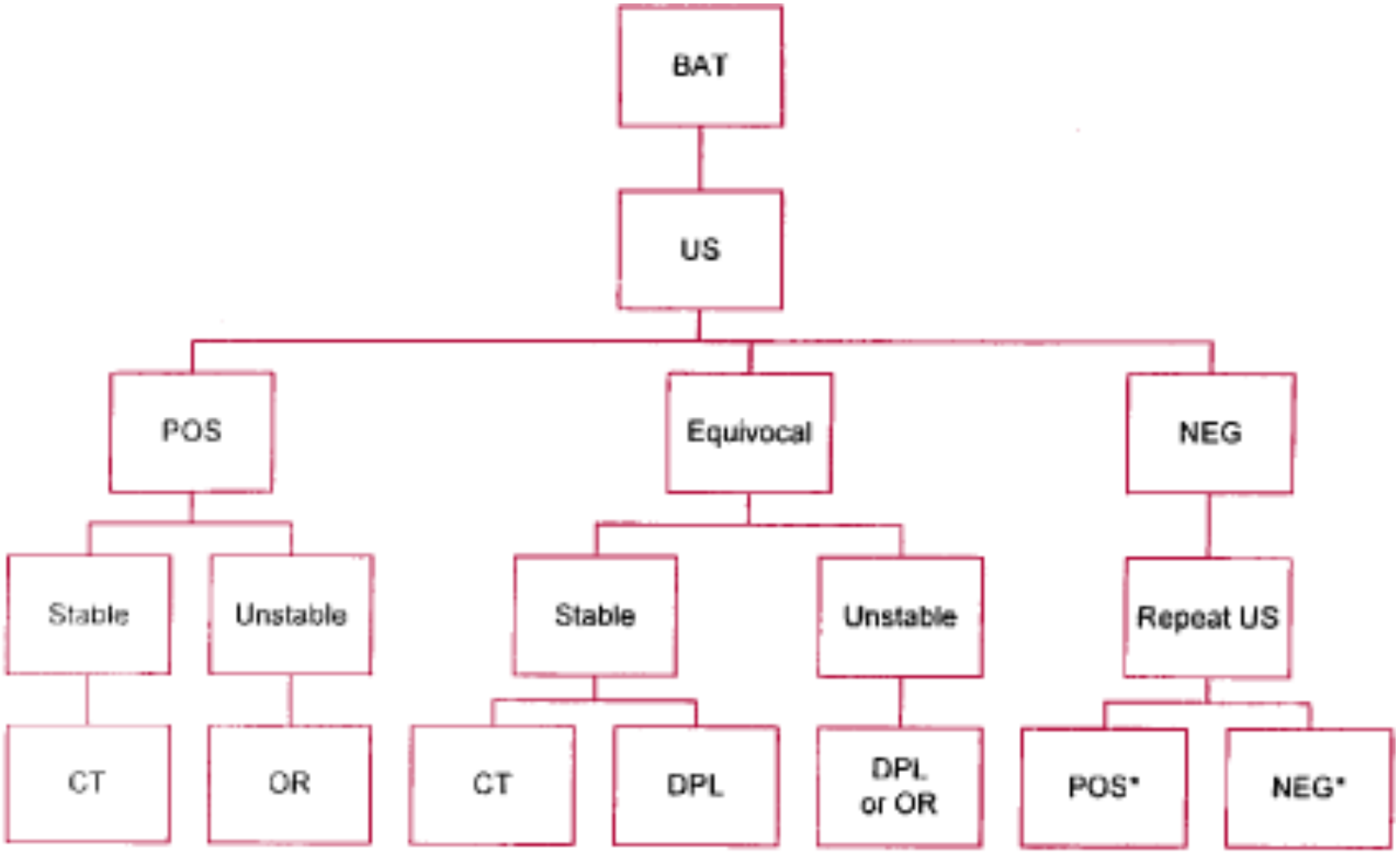
Table 3 Abdominal ultrasonography test characteristics

Ultrasound protocol	FAST (imaging solely for IP)	FAST (imaging solely for IP)	Imaging for both IP and solid organs
Outcome of Interest	Hemoperitoneum	Any IAI [a]	Any IAI [a]
	(n = 15)	(n = 11)	(n = 12)
Sensitivity	80% (76%-84%)	66% (60%-71%)	82% (78%-86%)
Specificity	96% (95%-97%)	93% (92%-95%)	97% (96%-97%)
Likelihood ratio positive	22.9 (17.2-30.5)	9.8 (7.9-12.1)	24.5 (19.0-31.6)
Likelihood ratio negative	0.2 (0.16-0.25)	0.37 (0.32-0.43)	0.18 (0.15-0.23)

95% CIs are provided in parenthesis.
IP indicates intraperitoneal fluid.
[a] Any IAI refers to those IAIs with and without hemoperitoneum.

  - Sensibilité 66-80%, spécificité 95% (Holmes et al., JPS 2007)
  - Quelle est l'utilité du FAST? Doit-on s'en servir pour modifier notre algorithme d'investigation chez le patient stable?

Algorithme d'investigation radiologique selon le FAST



Trauma, 6th Edition, Mattox et al.

J Trauma Acute Care Surg. 2014 Sep;77(3):427-32. doi: 10.1097/TA.0000000000000296.

Use of the focused assessment with sonography for trauma (FAST) examination and its impact on abdominal computed tomography use in hemodynamically stable children with blunt torso trauma.

Menaker J[1], Blumberg S, Wisner DH, Dayan PS, Tunik M, Garcia M, Mahajan P, Page K, Monroe D, Borgialli D, Kuppermann N, Holmes JF; Intra-abdominal Injury Study Group of the Pediatric Emergency Care Applied Research Network (PECARN).

⊕ Author information

Abstract

BACKGROUND: The aim of this study was to evaluate the variability of clinician-performed Focused Assessment with Sonography for Trauma (FAST) examinations and its impact on abdominal computed tomography (AbCT) use in hemodynamically stable children with blunt torso trauma (BTT). The FAST is used with variable frequency in children with BTT.

METHODS: We performed a planned secondary analysis of children (<18 years) with BTT. Patients with a Glasgow Coma Scale (GCS) score of less than 9, those with hypotension, and those taken directly to the operating suite were excluded. Clinicians documented their suspicion for intra-abdominal injury (IAI) as very low, less than 1%; low, 1% to 5%; moderate, 6% to 10%; high, 11% to 50%; or very high, greater than 50%. We determined the relative risk (RR) for AbCT use based on undergoing a FAST examination in each of these clinical suspicion strata.

RESULTS: Of 6,468 (median age, 11.8 years; interquartile range, 6.3-15.5 years) children who met eligibility, 887 (13.7%) underwent FAST examination before CT scan. A total of 3,015 (46.6%) underwent AbCT scanning, and 373 (5.8%) were diagnosed with IAI. Use of the FAST increased as clinician suspicion for IAI increased, 11.0% with less than 1% suspicion for IAI, 13.5% with 1% to 5% suspicion, 20.5% with 6% to 10% suspicion, 23.2% with 11% to 50% suspicion, and 30.7% with greater than 50% suspicion. The patients in whom the clinicians had a suspicion of IAI of 1% to 5% or 6% to 10% were significantly less likely to undergo a CT scan if a FAST examination was performed: RR, 0.83 (0.67-1.03); RR, 0.81 (0.72-0.91); RR, 0.85 (0.78-0.94); RR, 0.99 (0.94-1.05); and RR, 0.97 (0.91-1.05) for patients with clinician suspicion of IAI of less than 1%, 1% to 5%, 6% to 10%, 11% to 50%, and greater than 50%, respectively.

CONCLUSION: The FAST examination is used in a relatively small percentage of children with BTT. Use increases as clinician suspicion for IAI increases. Patients with a low or moderate clinician suspicion of IAI are less likely to undergo AbCT if they receive a FAST examination. A randomized controlled trial is required to more precisely determine the benefits and drawbacks of the FAST examination in the evaluation of children with BTT.

Peut on augmenter la valeur du FAST comme outil de dépistage?

J Surg Res. 2009 Nov;157(1):103-7. doi: 10.1016/j.jss.2009.03.058. Epub

Pediatric FAST and elevated liver transaminase

Sola JE[1], Cheung MC, Yang R, Koslow S, Lanuti E, Seaver C, Nev

Author information

Abstract

BACKGROUND: The current standard for the evaluation of ch
lab values, and computed tomography (CT) scan. We sought
with elevated liver transaminases (AST/ALT) could be used as

METHODS: Registry data at a level 1 trauma center was retro
16 y included demographics, injury mechanism, ISS, GCS, im
considered positive if either one was >100 IU/L.

RESULTS: Overall, 3171 cases were identified. A total of 100
received both. Of the 497 patients, 400 (87.1%) also had AST and ALT measured. FAST was 50% sensitive, 91% specific, with a positive predictive value (PPV) of 68%, negative predictive value (NPV) of 83%, and accuracy of 80%. Combining FAST with elevated AST or ALT resulted in a statistically significant increase in all measures (sensitivity 88%, specificity 98%, PPV 94%, NPV 96%, accuracy 96%).

CONCLUSIONS: FAST combined with AST or ALT > 100 IU/L is an effective screening tool for IAI in children following BAT. Pediatric patients with a negative FAST and liver transaminases < 100 IU/L should be observed rather than subjected to the radiation risk of CT.

TABLE 3

Statistics of FAST and FAST + Elevated AST/ALT.

	FAST	FAST + AST/ALT	*P* value
True positives	68	89	
True negatives	330	293	
False positives	32	6	
False negatives	67	12	
Sensitivity	50.4	88.1	<0.001
Specificity	91.2	98.0	<0.001
Positive predictive value	68.0	93.7	<0.001
Negative predictive value	83.1	96.1	<0.001
Accuracy	80.1	95.5	<0.001

Investigations radiologiques

- Limiter le plus possible l'utilisation du CT scan
- Consulter un expert à Ste-Justine avant de procéder au CT scan
  - Équipe radiologique dédiée à l'écho en trauma à Ste-Justine
  - Protocoles ALARA
- Souvent, la prise en charge du trauma d'un organe solide est inchangée par le CT scan

Trauma hépatique & splénique

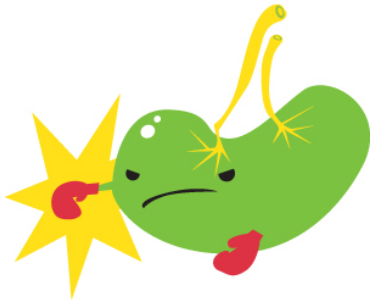
- Chacun représente environ le 1/3 de tous les trauma abdominaux
- Plus de 90% sont traités de façon conservatrice

Trauma hépatique

Liver Injury Scale

Grade*		Description	AIS-90
I	Hematoma	Subcapsular, <10% surface area	2
	Laceration	Capsular tear, <1 cm parenchymal depth	2
II	Hematoma	Subcapsular, 10-50% surface area	2
		Intraparenchymal, <10 cm in diameter	2
	Laceration	Capsular tear, 1-3 cm parenchymal depth, <10 cm length	2
III	Hematoma	Subcapsular, >50% surface area or expanding	3
		Ruptured subcapsular or parenchymal hematoma	3
		Intraparenchymal hematoma >10 cm or expanding	3
	Laceration	>3 cm parenchymal depth	3
IV	Laceration	Parenchymal disruption involving 25-75% of hepatic lobe or 1-3 Couinaud's segments within a single lobe	4
V	Laceration	Parenchymal disruption involving >75% of hepatic lobe or >3 Couinaud's segments within single lobe	5
	Vascular	Juxtahepatic venous injuries; i.e., retrohepatic vena cava/central major hepatic veins	5
	Vascular	Hepatic avulsion	6

* Advance one grade for multiple injuries up to grade III



Trauma splénique

Spleen Injury Scale

Grade*		Description	AIS-90
I	Hematoma	Subcapsular, <10% surface area	2
	Laceration	Capsular tear, <1 cm parenchymal depth	2
II	Hematoma	Subcapsular, 10-50% surface area	2
		Intraparenchymal, <5 cm in diameter	2
	Laceration	Capsular tear, 1-3 cm parenchymal depth which does not involve a trabecular vessel	2
III	Hematoma	Subcapsular, >50% surface area or expanding	3
		Ruptured subcapsular or parenchymal hematoma	3
		Intraparenchymal hematoma >5 cm or expanding	3
	Laceration	>3 cm parenchymal depth or involving trabecular vessels	3
IV	Laceration	Laceration involving segemental or hilar vessels producing major devascularization (>25% of spleen)	4
V	Laceration	Completely shattered spleen	5
	Vascular	Hilar vascular injury which devascularizes spleen	5

* Advance one grade for multiple injuries up to grade III

Evidence-Based Guidelines for Resource Utilization in Children With Isolated Spleen or Liver Injury

By Steven Stylianos and the APSA Trauma Committee
New York, New York

Table 1. Clinical Parameters in 832 Children With Isolated Spleen or Liver Injury

Age	
1-9 yr	474 (57%)
10-15 yr	308 (37%)
>15 yr	50 (6%)
Gender	65% boys
Diagnosis by CT	99.0% (8 patients taken directly to operating room without imaging)
CT grade	
I	116 (14%)
II	341 (41%)
III	275 (33%)
IV	100 (12%)
Mean Injury Severity Score	12.1

Grade 5 exclus

Stylianos et al., JPS 2000

Evidence-Based Guidelines for Resource Utilization in Children With Isolated Spleen or Liver Injury

By Steven Stylianos and the APSA Trauma Committee
New York, New York

Table 2. Resource Utilization and Activity Restriction in 832 Children With Isolated Spleen or Liver Injury

	CT Grade			
	I	II	III	IV
Admitted to ICU (%)	55.0	54.3	72.3	85.4
No. of hospital days (mean)	4.3	5.3	7.1	7.6
No. of hospital days (range)	1-7	2-9	3-9	4-10
Transfused (%)	1.8	5.2	10.1*	26.6*
Laparotomy (%)	None	1.0	2.7†	12.6†
Predischarge imaging (%)	13.9	32.4	34.8	37.9
Postdischarge imaging (%)	29.8	33.7	44.0	43.2
Activity restriction (mean)	5.1 wk	6.2 wk	7.5 wk	9.2 wk
Activity restriction (range)	2-6 wk	2-8 wk	4-12 wk	6-12 wk

*Grade III versus grade IV; $P < .014$.
†Grade III versus grade IV; $P < .0001$.

Stylianos et al., JPS 2000

Evidence-Based Guidelines for Resource Utilization in Children With Isolated Spleen or Liver Injury

By Steven Stylianos and the APSA Trauma Committee
New York, New York

Table 3. Proposed Guidelines for Resource Utilization in Children With Isolated Spleen or Liver Injury

	CT Grade			
	I	II	III	IV
ICU stay (d)	none	none	none	1
Hospital stay (d)	2	3	4	5
Predischarge imaging	none	none	none	none
Postdischarge imaging	none	none	none	none
Activity restriction (wk)*	3	4	5	6

*Return to full-contact, competitive sports (ie, football, wrestling, hockey, lacrosse, mountain climbing) should be at the discretion of the individual pediatric trauma surgeon. The proposed guidelines for return to unrestricted activity include "normal" age-appropriate activities.

Stylianos et al., JPS 2000

Splénectomie: centres de trauma pédiatriques vs les autres

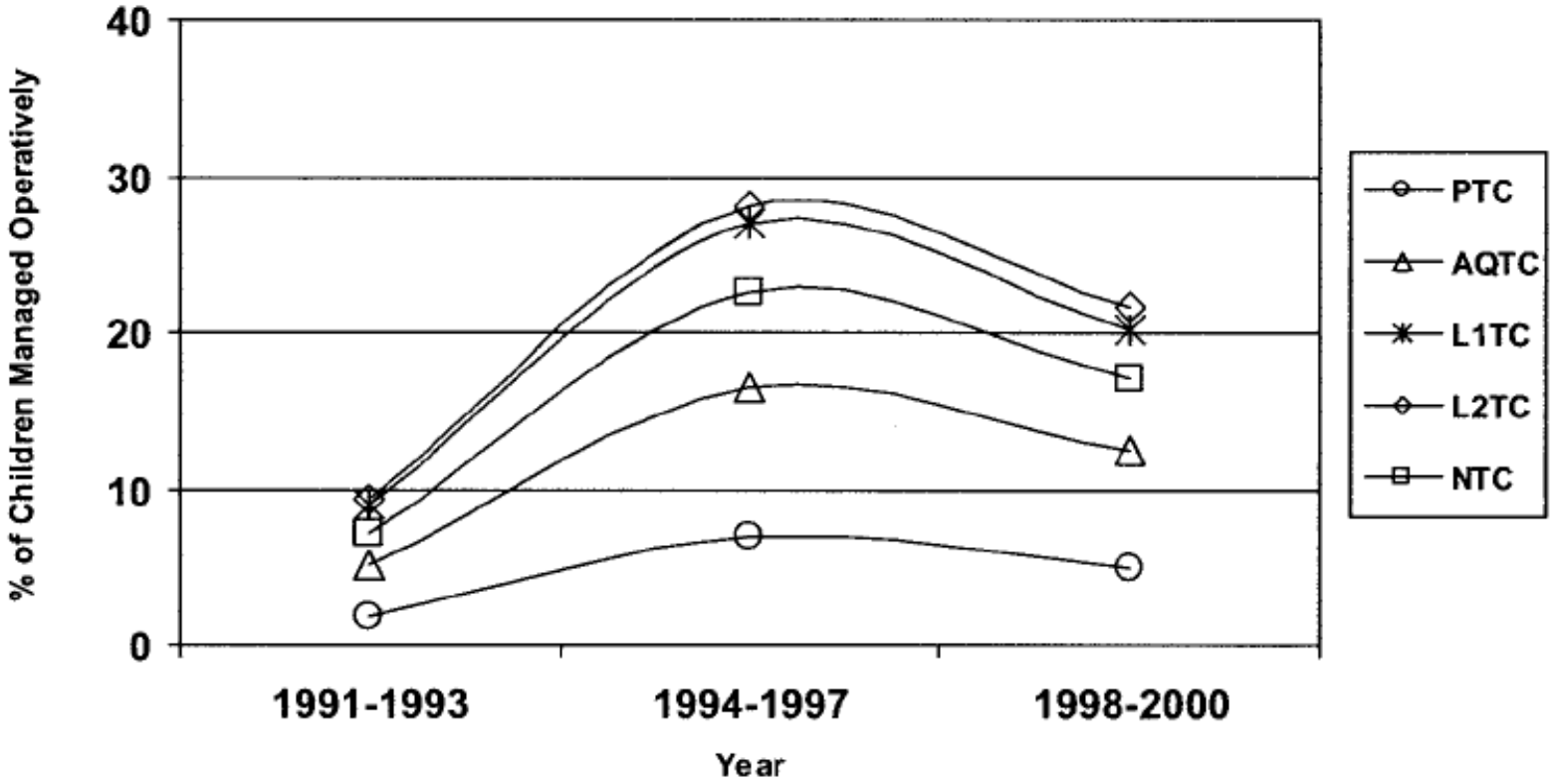


Fig 2. Operative management of splenic injury by hospital type, 1991–2000, adjusted for age and splenic injury severity.

Davis et al., Pediatrics 2005

Quel est l'impact des guidelines de l'APSA sur la pratique?

- Leinwand et al. 2004
  - Étude de cohorte, avant (92-97) et après (98-02) implémentation des guidelines de l'APSA
    - Diminution de la durée de séjour USI
    - Diminution de la durée de séjour hospitalier
    - Diminution du nombre de FSC
    - Diminution du nombre d'imagerie de suivi
- Davis et al. 2005
  - Diminution du taux de splénectomie
- Yanchar et al. 2009
  - Meilleure compliance aux guidelines de l'APSA dans les centres pédiatriques au Canada

Sommes nous différents au Canada?

Management of pediatric splenic injuries in Canada

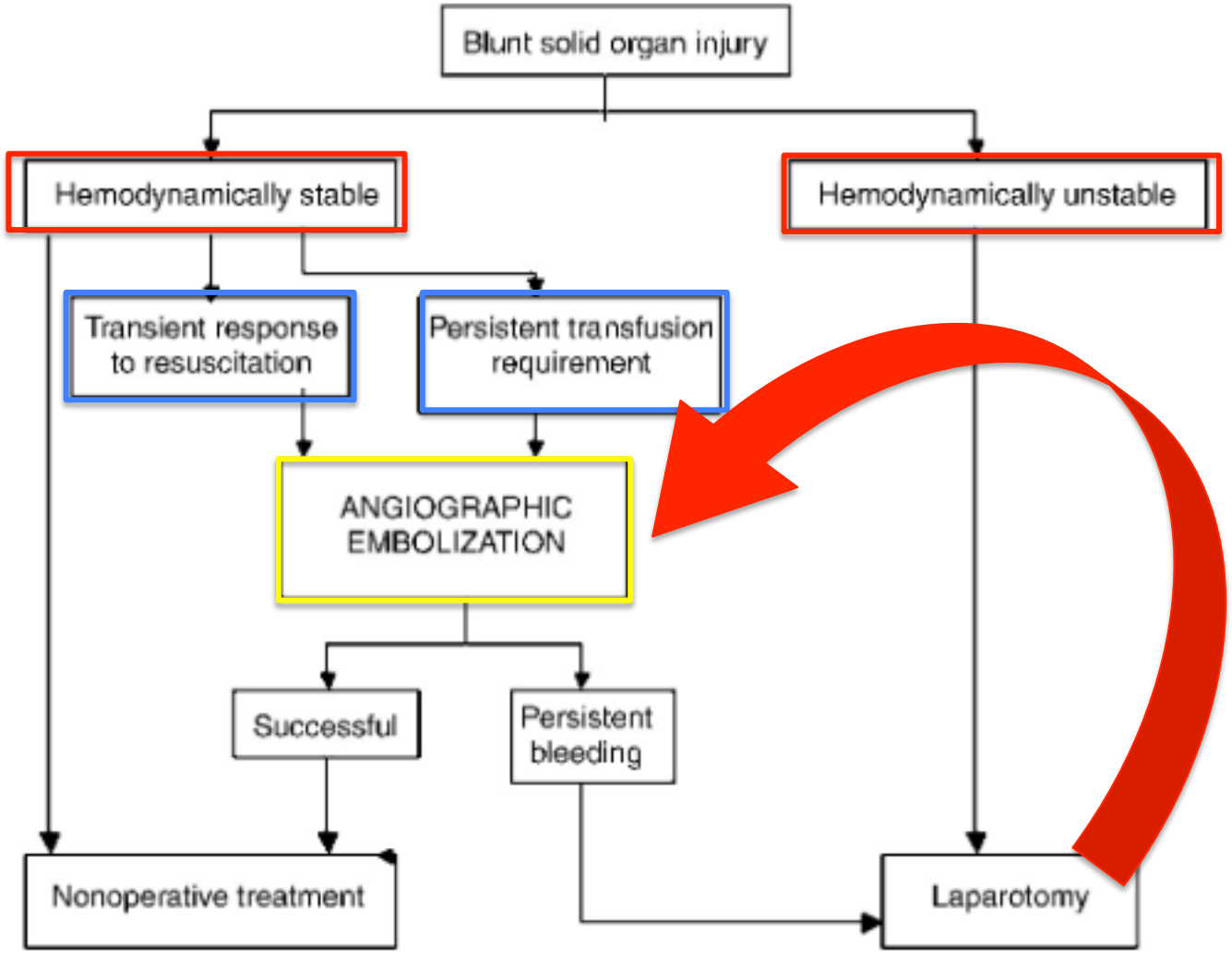
Table 2 Comparison of hospital types and outcomes

	Pediatric hospital (n = 654)	Nonpediatric hospital (n = 630)	Statistical significance of difference
Incidence of			
Receiving a blood transfusion (any volume)	13.5%	10.1%	$P = .13$
Length of stay >5 d	42.8%	38.7%	$P = .14$
ICU admission	40.7%	37.5%	$P = .24$
Splenectomy	2.3%	10.0%	$P < .0001$ (unadjusted odds ratio, 0.2; 95% confidence interval, 0.1-0.4)
Splenectomy or splenorrhaphy	2.3%	11.8%	$P < .0001$ (unadjusted odds ratio, 0.2; 95% confidence interval, 0.1-0.3)

- Après ajustements, odds ratio d'avoir une splénectomie en centre pédiatrique vs adulte est 0.2 (IC 95% 0.1-0.4)

Yanchar et al., JPS 2012

La place de l'embolisation…



Coran, 7th Ed, 2012

Et le fameux blush???

ARTICLE IN PRESS

The American Journal of Surgery (2015) ■, ■–■

Contrast blush in pediatric blunt splenic trauma does not warrant the routine use of angiography and embolization

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KEYWORDS:
Pediatric;
Splenic trauma;
Contrast blush;
Angiographic embolization

Abstract

BACKGROUND: Splenic artery embolization (SAE) in the presence of contrast blush (CB) has been recommended to reduce the failure rate of nonoperative management. We hypothesized that the presence of CB on computed tomography has minimal impact on patient outcomes.

METHODS: A retrospective review was conducted of all children (<18 years) with blunt splenic trauma over a 10-year period at a level 1 pediatric trauma center. Data are presented as mean ± standard error of mean.

RESULTS: Seven hundred forty children sustained blunt abdominal trauma, of which 549 had an identified solid organ injury. Blunt splenic injury was diagnosed in 270 of the 740 patients. All patients were managed nonoperatively without SAE. CB was seen on computed tomography in 47 patients (17.4%). There were no significant differences in the need for blood transfusion (12.5% vs 11.1%) or length of stay (3.1 vs 3.3 days) or need for splenectomy when compared in children with or without CB.

CONCLUSION: Pediatric trauma patients with blunt splenic injuries can be safely managed without SAE and physiologic response and hemodynamic stability should be the primary determinants of appropriate management.

Trauma rénal

- Plus de 50% des trauma génito-urinaires
- Trauma rénal chez 10-20% des trauma contondants et 3-6% des trauma pénétrants
- Autres trauma intra-abdominaux associés dans 42-74%

Investigations

- Gold-standard=CT scan avec contraste IV et phase retardée (pour arbre urinaire). Encore une fois, beaucoup d'écho seulement à HSJ.
- Controverse: à quel degré d'hématurie microscopique faut-il investiguer pour un trauma rénal?
- Critères adultes: Hématurie macroscopique ou hématurie microscopique avec choc (TAs<90)
  - Mais choc compensé +++ chez enfants
  - Tenir compte de l'ensemble du portrait

Des études rétrospectives tentent de valider les critères adultes dans la population pédiatrique… Études prospectives à venir…

Urology. 2011 Jan;77(1):187-90. doi: 10.1016/j.urology.2010.05.014. Epub 2010 Aug 12.

Use of adult criteria for slice imaging may limit unnecessary radiation exposure in children presenting with hematuria and blunt abdominal trauma.

Raz O[1], Haifler M, Copel L, Lang E, Abu-Kishk I, Eshel G, Klin B, Lindner A, Zisman A.

⊕ **Author information**

Abstract

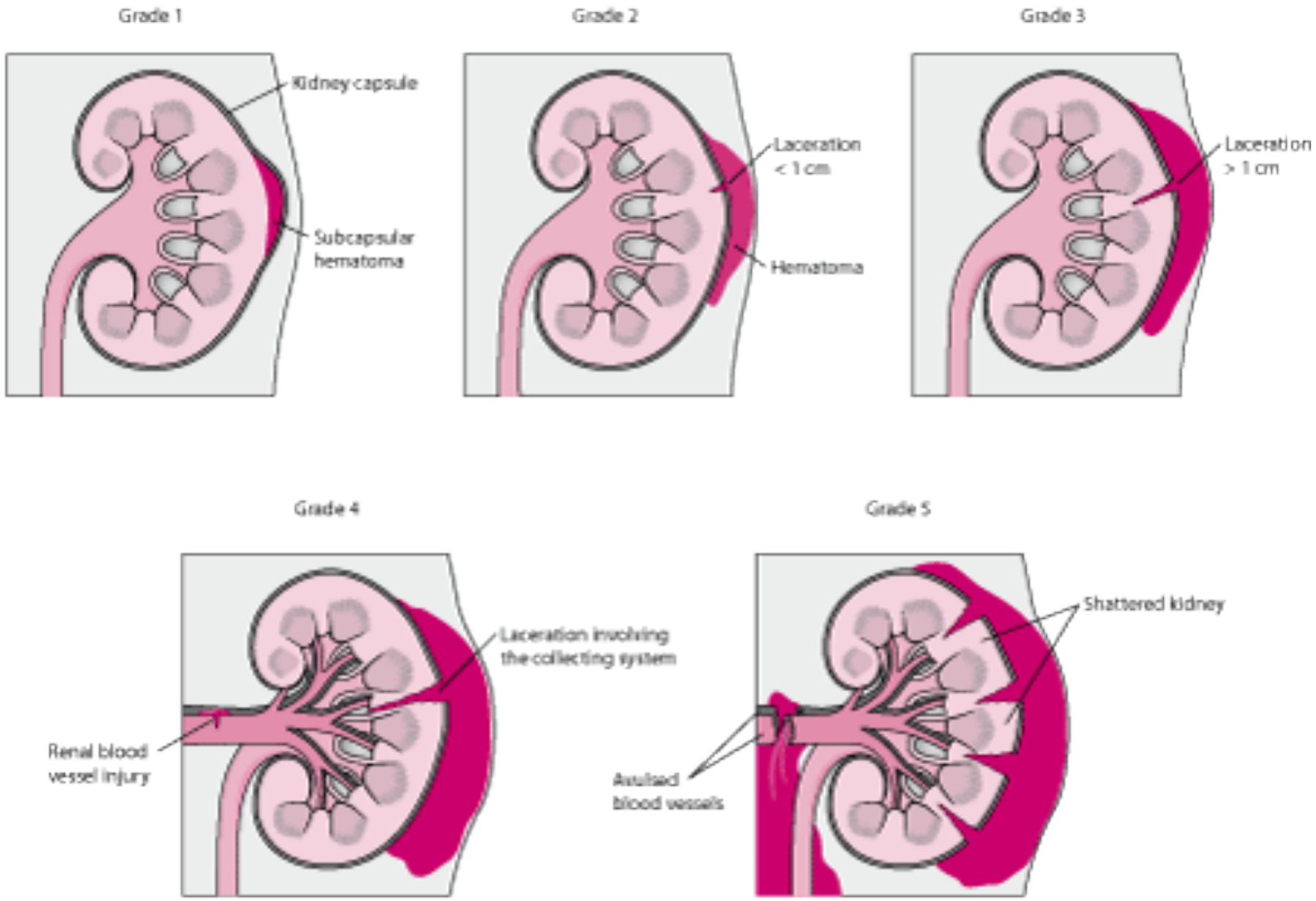
OBJECTIVE: To examine whether it would be safe to use adult criteria for imaging in pediatric blunt renal trauma and hematuria.

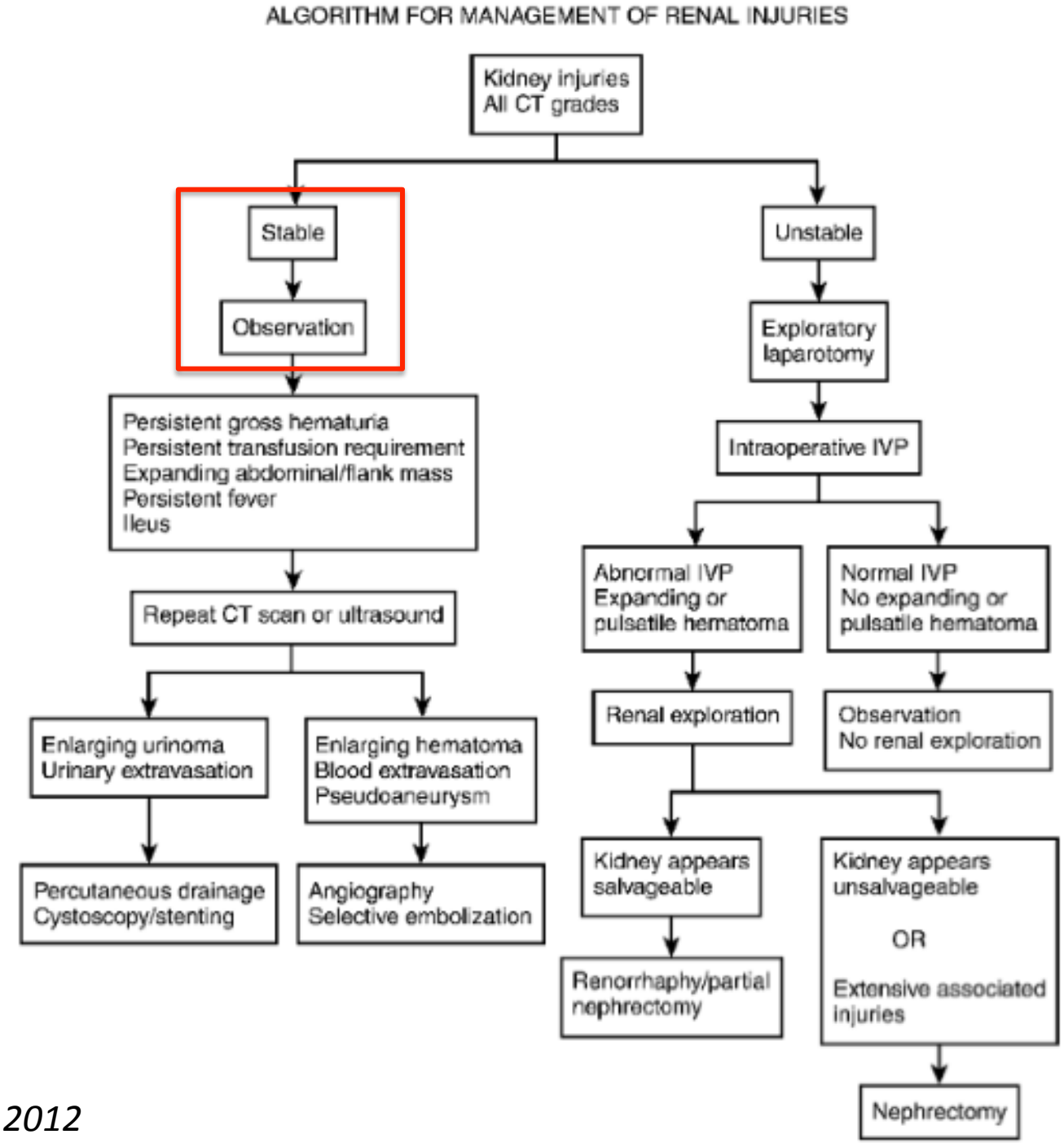
MATERIAL AND METHODS: From 1999 to 2007, 46 consecutive children were admitted for renal trauma and hematuria. All had abdominal computed tomography (CT) scan. Patients were divided into 2 groups: microhematuria and macrohematuria. Outcomes analyzed were presence of renal injury per CT, grade of renal injury, and indication for and details of surgical intervention.

RESULTS: Twenty-seven patients (59%) had microhematuria. Nineteen (41%) had macrohematuria. On abdominal CT scan, no injury was found in 18 patients with microhematuria (67%) and 3 (16%) with macrohematuria. Two microhematuria patients required surgical intervention. In both cases, no actual renal intervention was performed during surgery. Three macrohematuria patients required surgical intervention; all had renal relevant procedures. The performance of the macro-microhematuria distinction in the prediction of renal injury on CT scan is relatively poor: sensitivity 59%, specificity 14%, positive predictive value (PPV) 84%, and negative predictive value (NPV) 62%, whereas the performance of macrohematuria criteria in the prediction of renal-relevant injury is sensitivity 100%, specificity 61%, PPV 18%, and NPV 93%.

CONCLUSIONS: The yield of abdominal CT in pediatric renal trauma is low in patients presenting with microhematuria. Our data suggest that it may be possible that adult criteria for renal imaging are sufficient for children with abdominal blunt trauma and microhematuria. Adopting such strategy will result in substantial reduction in exposure to radiation, supposedly without increasing the patient's risk.

Trauma rénal



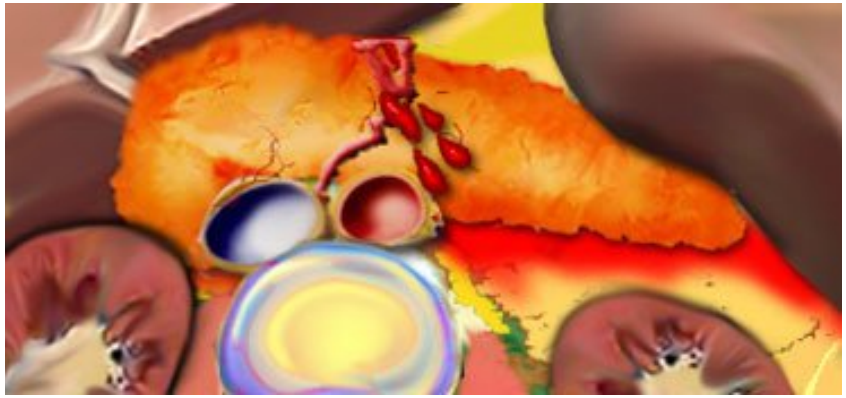


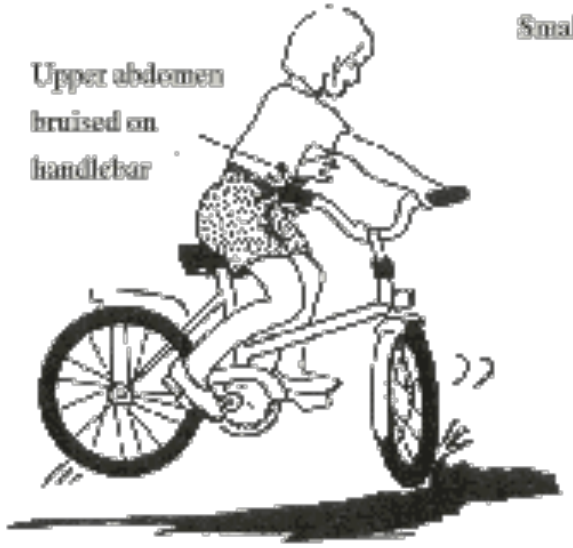
Coran, 7th Ed, 2012

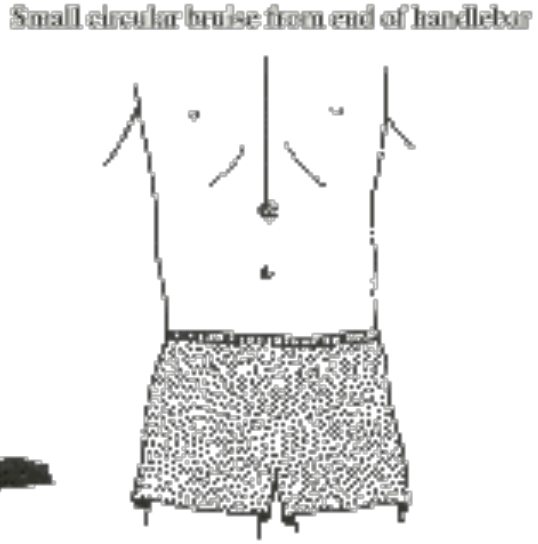
À quoi faut-il penser?

“Handlebar injury”

- Rechercher le trauma pancréatique et le trauma duodénal (et autres viscères creux)







Trauma du carrefour pancréatico-duodénal

- <10% des trauma abdominaux contondants
- Pour tous les traumas duodénaux, les hématomes sont plus fréquents que les perforations
- Les trauma du pancréas sont plus fréquents que les trauma duodénaux

Trauma du carrefour pancréatico-duodénal

- Traitement du trauma duodénal
  - Hématome: conservateur, TNG et gavages via TNJ ou HAIV
  - Perforation: laparotomie
- Traitement du trauma pancréatique
  - Bas grade: conservateur, NPO, gavages ou HAIV
  - Haut grade: 2 grandes écoles de pensées: conservateur vs pancréatectomie distale

Opérer ou ne pas opérer, là est la question…

Cochrane Database Syst Rev. 2014 Feb 12;2:CD009746. doi: 10.1002/14651858.CD009746.pub2.

Non-operative versus operative treatment for blunt pancreatic trauma in children.

Haugaard MV[1], Wettergren A, Hillingsø JG, Gluud C, Penninga L.

⊕ Author information

Abstract

BACKGROUND: Pancreatic trauma in children is a serious condition with high morbidity. Blunt traumatic pancreatic lesions in children can be treated non-operatively or operatively. For less severe, grade I and II, blunt pancreatic trauma a non-operative or conservative approach is usually employed. Currently, the optimal treatment, of whether to perform operative or non-operative treatment of severe, grade III to V, blunt pancreatic injury in children is unclear.

OBJECTIVES: To assess the benefits and harms of operative versus non-operative treatment of blunt pancreatic trauma in children.

SEARCH METHODS: We searched the Cochrane Injuries Group's Specialised Register, Cochrane Central Register of Controlled Trials (Issue 5, 2013), MEDLINE (OvidSP), EMBASE (OvidSP), ISI Web of Science (SCI-EXPANDED and CPCI-S) and ZETOC. In addition, we searched bibliographies of relevant articles, conference proceeding abstracts and clinical trials registries. We conducted the search on the 21 June 2013.

SELECTION CRITERIA: We planned to select all randomised clinical trials investigating non-operative versus operative treatment of blunt pancreatic trauma in children, irrespective of blinding, publication status or language of publication.

DATA COLLECTION AND ANALYSIS: We used relevant search strategies to obtain the titles and abstracts of studies that were relevant for the review. Two review authors independently assessed trial eligibility.

MAIN RESULTS: The search found 83 relevant references. We excluded all of the references and found no randomised clinical trials investigating treatment of blunt pancreatic trauma in children.

AUTHORS' CONCLUSIONS: This review shows that strategies regarding non-operative versus operative treatment of severe blunt pancreatic trauma in children are not based on randomised clinical trials. We recommend that multi-centre trials evaluating non-operative versus operative treatment of paediatric pancreatic trauma are conducted to establish firm evidence in this field of medicine.

J Am Coll Surg. 2014 Feb;218(2):157-62. doi: 10.1016/j.jamcollsurg.2013.10.012. Epub 2013 Oct 25.

Operative vs nonoperative management for blunt pancreatic transection in children: multi-institutional outcomes.

Iqbal CW[1], St Peter SD[2], Tsao K[3], Cullinane DC[4], Gourlay DM[5], Ponsky TA[6], Wulkan ML[7], Adibe OO[8]; Pancreatic Trauma in Children (PATCH) Study Group.

⊕ Collaborators (16)

⊕ Author information

Abstract

BACKGROUND: The management of traumatic pancreatic transection remains controversial.

STUDY DESIGN: A multi-institutional review from 1995 to 2012 was conducted comparing operative with nonoperative management for grades II and III blunt pancreatic injuries in patients younger than 18 years.

RESULTS: Fourteen pediatric trauma centers participated, yielding 167 patients; 57 underwent distal pancreatectomy and 95 were managed nonoperatively. Fifteen patients treated with operative drain placement only were studied separately. Patients undergoing resection had a shorter time to goal oral feeds (7.8 ± 0.7 days vs 15.1 ± 2.5 days; p = 0.007) and a lower rate of pseudocyst formation (0% vs 18%; p = 0.001). Pseudocyst formation resulted in a greater need for endoscopic and interventional radiologic procedures (26% vs 2%; p = 0.002) in the nonoperative group, as well as a longer time to complete resolution (38.6 ± 6.4 days vs 22.6 ± 5.0 days; p = 0.05) compared with resection. When looking at those patients with clear evidence of main duct injury at presentation, those undergoing resection also had fewer complications (33% vs 61%; p = 0.05) and fewer total days in-hospital (12.6 ± 8.4 days vs 17.5 ± 9.7 days; p = 0.04) compared with nonoperative management.

CONCLUSIONS: In children with blunt pancreatic injury, distal pancreatectomy is superior to nonoperative management with more rapid resumption of diet, fewer repeat interventions, and a shorter period to complete resolution. When the main duct is involved, the benefits to operative resection also include lower morbidity and fewer days of hospitalization. Therefore, assessing the status of the pancreatic duct is paramount in determining management.

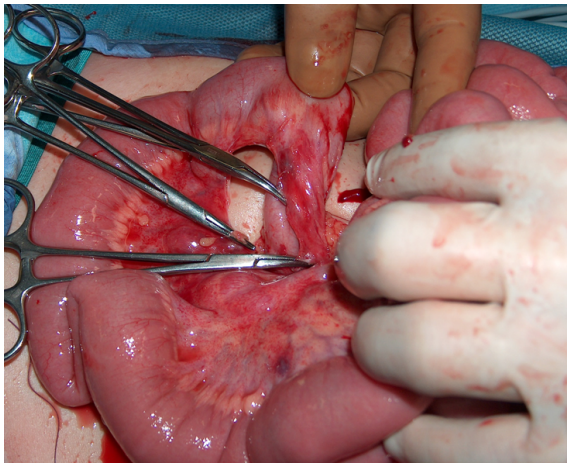
L’avenir…

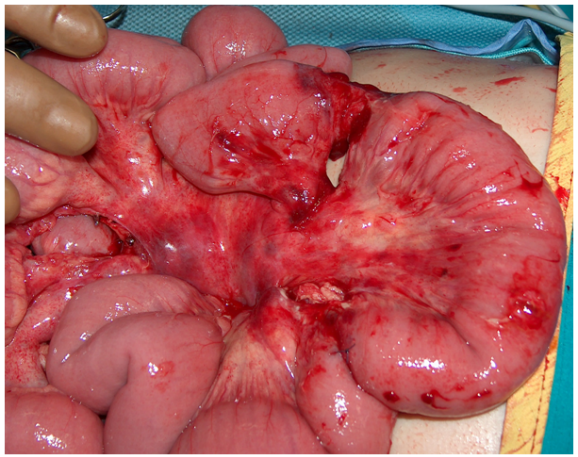
- Une étude randomisée contrôlée multi-centrique pour trauma pancréatique de grade 3 et plus devrait débutée dans les prochaines années

À quoi faut-il penser?

Triade de Chance

- Signe de la ceinture de sécurité
- Fracture lombaire
- Trauma intestinal ou mésentérique





Signe de la ceinture de sécurité

- Étude rétrospective à Ste-Justine de 1998 à 2008 chez les enfants avec signe de la ceinture de sécurité
- n=53
- 83% avec douleur abdo à l'arrivée
- 55% avec trauma intra-abdo, le plus fréquent étant le trauma intestinal/mésentérique (25%)
- 19% ont eu besoin d'une laparotomie
- 17% avaient des fractures lombaires

Indications de transfert en centre pédiatrique

- **Ne pas oublier les critères de transfert de l'ATLS**
- Âge < 5 ans
- Glasgow < 14
- Trauma organe solide
- Soutien ventilatoire, cardiovasculaire, rénal ou nutritionnel
- Trauma du rachis
- Brûlures > 10% chez < 10 ans (20% chez les > 10 ans) + critères American Burn Association

Où appeler pour transférer un patient à Ste-Justine?

- Ou simplement pour demander des conseils à notre équipe…
- **CCAR (Centre de Coordination des Activités Réseau):**
- **514-345-4992**

Procédure des niveaux d'activation à Ste-Justine

- Niveaux 1, 2 ou 3 déterminés avant le transfert ou en pré-hospitalier afin d'activer l'équipe nécessaire
- Vous parlerez à l'urgentologue de Ste-Justine, au coordo de trauma et soins intensifs dans un appel conférence
- On vous demandera le temps estimé d'arrivée du patient
- On vous demandera de donner le numéro du téléphone rouge de Ste-Justine aux aumbulanciers pour qu'ils appellent 15 minutes avant l'arrivée à Ste-Justine

CHU Sainte-Justine
Le centre hospitalier universitaire mère-enfant

Pour l'amour des enfants

Université de Montréal

NIVEAUX D'ACTIVATION EN TRAUMA

NIVEAU 1

- Arrêt cardiorespiratoire
- Tous signes de choc:
  - Hypotension selon l'âge du patient
    <1 an: Pression systolique <60 mmHg
    1-10 ans: Pression systolique <(70+2*âge) mmHg
    >10 ans: <90 mmHg
  - Signes d'hémorragie significative
  - Transfusions en cours
- Tous signes de difficultés respiratoires:
  - Obstruction des voies respiratoires hautes secondaires à trauma
  - Signes d'insuffisance respiratoire (hypoxie, utilisation des muscles accessoires, "grunting")
  - Murmures vésiculaires diminués à l'ausculation
- Trauma crânien sévère (GCS<9)
- Trauma pénétrant à la tête, cou, torse ou extrémités proximales au coude/genou
- Fracture du bassin
- Suspicion de lésion médullaire
- Amputation proximale au poignet/cheville
- Brûlures de >30% de la surface corporelle totale, explosion dans un espace clos
- Selon le jugement du pédiatre urgentologue en service

NIVEAU 2

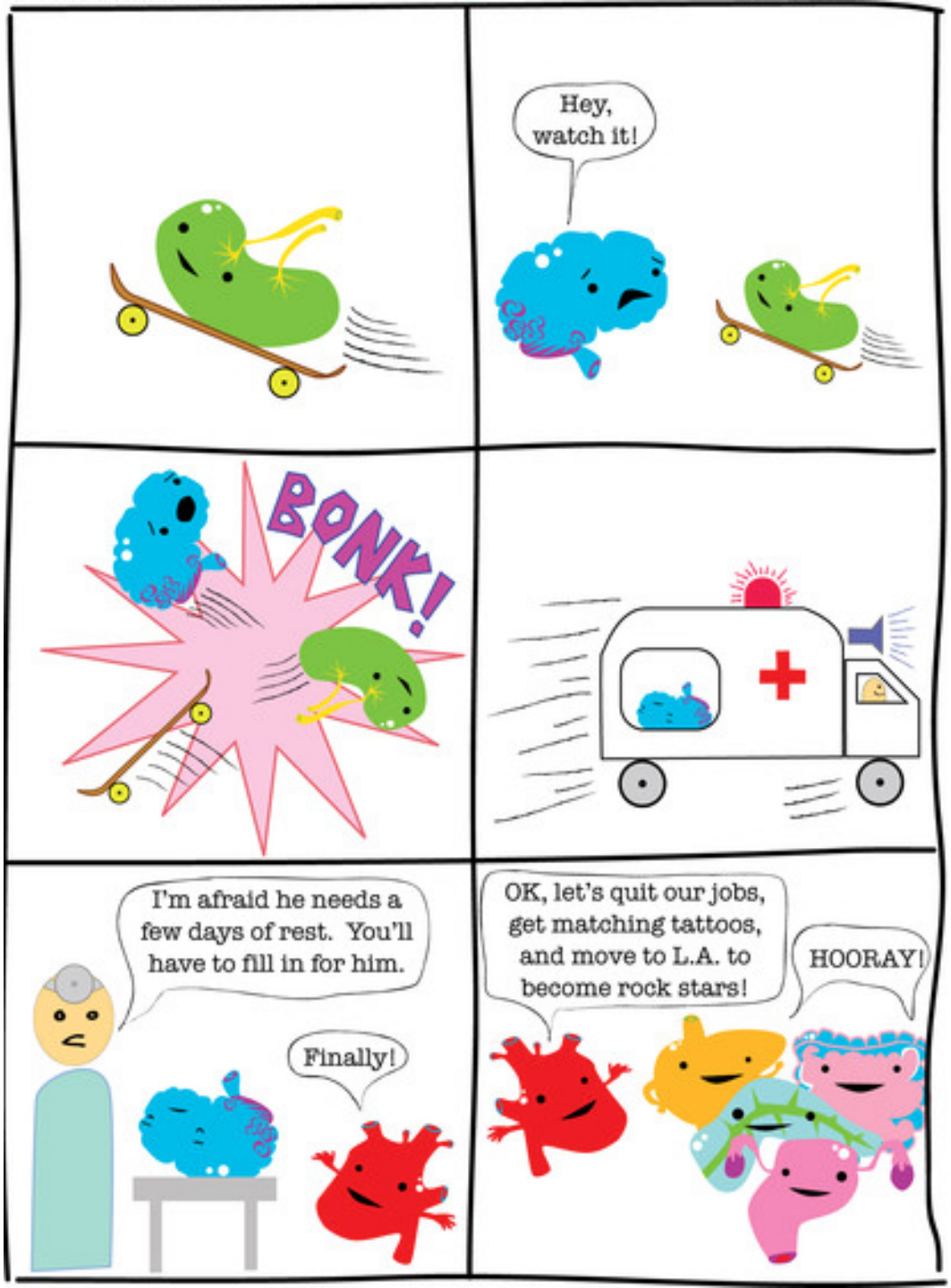
- Évidence de trauma abdominal sans compromis hémodynamique
  - Abdomen distendu et/ou douloureux
  - Signe de la ceinture de sécurité/abrasion abdominale
- Trauma crânien modéré (GCS 9-12)
- Fracture d'au moins 1 os long avec mécanisme significatif
- Brûlure de 15-30% de la surface corporelle totale
- Selon le jugement du pédiatre urgentologue en service

NIVEAU 3

- Passager d'un accident de voiture
- Piéton/vélo avec collision de voiture
- Chute de plus de 5 mètres
- Tous patient transféré pour trauma et stable
- Tous patient transféré pour trauma en vue d'une chirurgie
- Selon le jugement du pédiatre urgentologue en service

Comité d'évaluation de la traumatologie
20 janvier 2015

Questions?


Hey, watch it!
BONK!
I'm afraid he needs a few days of rest. You'll have to fill in for him.
Finally!
OK, let's quit our jobs, get matching tattoos, and move to L.A. to become rock stars!
HOORAY!