BIBLIOGRAPHIE DE L'ECHOGRAPHIE OSSEUSE

Dr Bruno LAURE

Diplôme universitaire d'échographie appliquée aux urgences de Lyon

Session 2015-2016

Injury, Int. J. Care Injured 41 (2010) 862–868

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

Accuracy of clinician-performed point-of-care ultrasound for the diagnosis of fractures in children and young adults☆

Eric R. Weinberg [1], Michael G. Tunik, James W. Tsung *

Division of Paediatric Emergency Medicine, Department of Paediatrics and Emergency Medicine, Bellevue Hospital Centre/NYU School of Medicine, New York, NY, USA

- Etude prospective Juillet 2007 à Mai 2008
- Par 10 urgentistes après une formation d'une heure
- Patients de moins de 25 ans
- Référence : Radiographie ou scanner

Injury, Int. J. Care Injured 41 (2010) 862–868

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

Accuracy of clinician-performed point-of-care ultrasound for the diagnosis of fractures in children and young adults☆

Eric R. Weinberg [1], Michael G. Tunik, James W. Tsung *

Division of Paediatric Emergency Medicine, Department of Paediatrics and Emergency Medicine, Bellevue Hospital Centre/NYU School of Medicine, New York, NY, USA

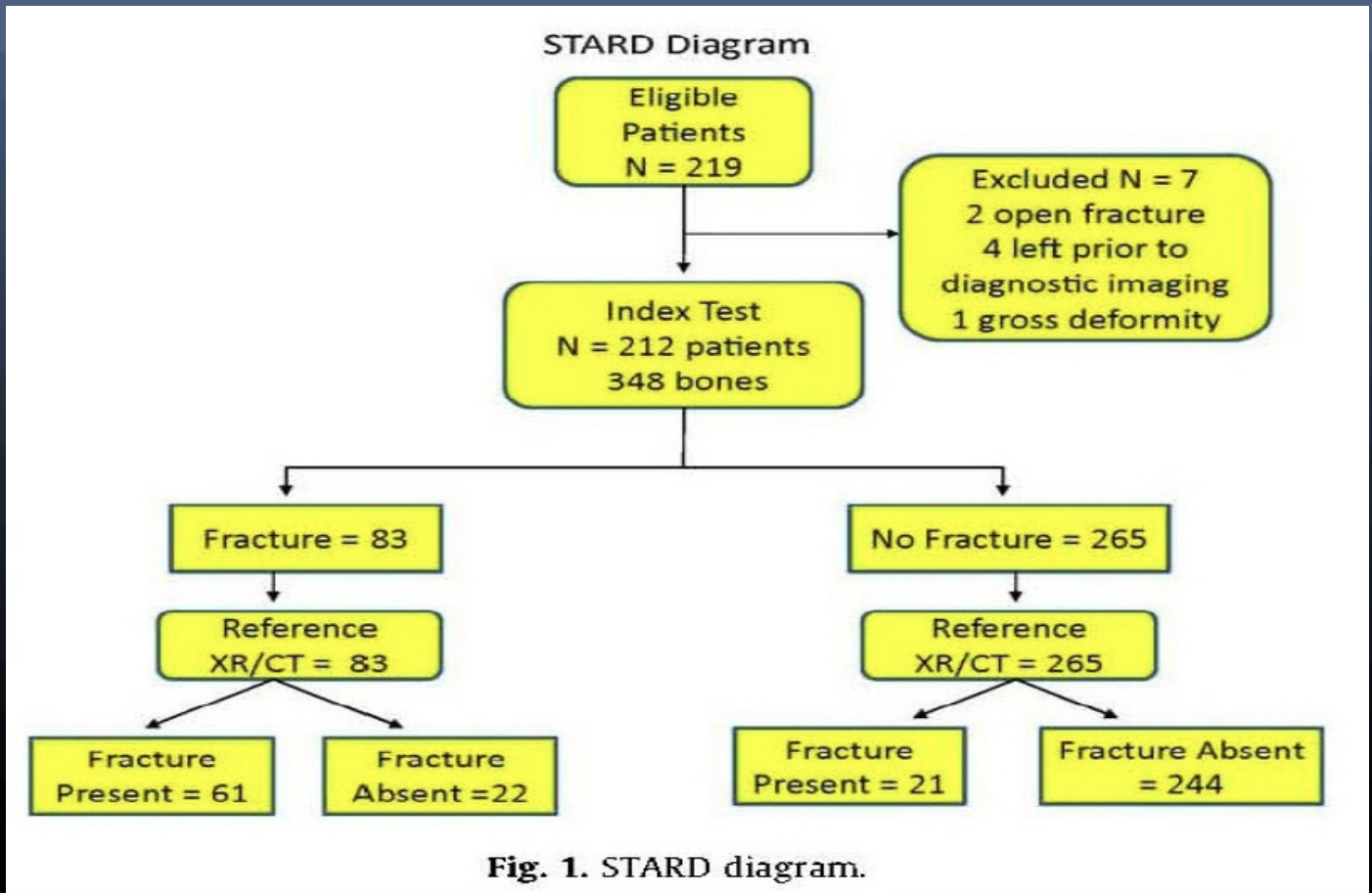


Fig. 1. STARD diagram.

Injury, Int. J. Care Injured 41 (2010) 862–868

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

Accuracy of clinician-performed point-of-care ultrasound for the diagnosis of fractures in children and young adults☆

Eric R. Weinberg [1], Michael G. Tunik, James W. Tsung *

Division of Paediatric Emergency Medicine, Department of Paediatrics and Emergency Medicine, Bellevue Hospital Centre/NYU School of Medicine, New York, NY, USA

Table 2
Test performance characteristics for point-of-care ultrasound diagnosis of fractures.

	N	Fx rate (%)	Sensitivity	Specificity	LR+	LR−
Overall	348	24	73 (62–82)	92 (88–95)	9.6 (6.2–14.9)	0.30 (0.21–0.42)
Age < 18	234	25	78 (65–87)	93 (87–95)	10.5 (6.1–18.0)	0.24 (0.15–0.38)
Age > 18	114	22	60 (39–78)	92 (87–96)	7.6 (3.5–16.6)	0.43 (0.27–0.70)
Long bones	195	26	73 (58–84)	92 (86–95)	8.7 (4.9–15.3)	0.30 (0.19–0.47)
Non-long bones	153	21	77 (58–90)	93 (87–97)	11.6 (5.8–23.3)	0.24 (0.13–0.46)
Sonologist with <25 US exams	127	26	61 (42–76)	89 (81–95)	5.7 (3.0–10.9)	0.44 (0.29–0.67)
Sonologist with >25 US exams	221	23	80 (66–90)	94 (89–97)	13.7 (7.4–25.3)	0.21 (0.12–0.36)

Abbreviations: *N* = number; Fx = fracture; LR+ = likelihood ratio for a positive test; LR− = likelihood ratio for a negative test; () = 95% confidence intervals, US = ultrasound.

Table 3
Individual bone test characteristics for point-of-care ultrasound diagnosis of fractures.

Bone	*N*	Fx rate (%)	Sensitivity	Specificity	LR+	LR−
Skull	21	10	100 (20–100)	100 (79–100)	Infinity	0
Mandible	11	27	67 (13–98)	100 (60–100)	Infinity	0.33 (0.07–1.65)
Clavicle	15	60	89 (51–99)	83 (36–99)	5.3 (0.87–32.4)	0.13 (0.01–0.90)
Rib	10	10	100 (5–100)	89 (51–99)	9 (1.4–57)	0
Proximal humerus	15	13	100 (20–100)	100 (72–100)	Infinity	0
Radius	40	35	71 (42–90)	81 (60–93)	3.7 (1.6–8.7)	0.35 (0.15–0.82)
Ulna	30	27	50 (17–83)	95 (75–100)	11 (1.4–84)	0.52 (0.26–1.05)
Metacarpal	32	16	80 (30–99)	85 (65–95)	5.4 (2.0–14.8)	0.23 (0.04–1.37)
Phalange	37	22	50 (17–83)	97 (80–100)	14.5 (1.9–112.3)	0.51 (0.26–1.03)
Femur	5	0	N/A	80 (30–99)	N/A	N/A
Patella	8	0	N/A	100 (60–100)	N/A	N/A
Tibia	34	18	83 (37–99)	93 (75–98)	11.7 (2.9–46.5)	0.18 (0.02–1.08)
Fibula	40	15	67 (24–94)	97 (83–100)	22.7 (3.0–169.5)	0.34 (0.11–1.07)
Metatarsal	17	18	100 (31–100)	93 (64–100)	14 (2.1–93.5)	0
Elbow/posterior fat pad	30	50	80 (51–95)	87 (58–98)	6 (1.6–22.3)	0.23 (0.08–0.65)

Abbreviations: *N* = number; Fx = fracture; LR+ = likelihood ratio for a positive test; LR− = likelihood ratio for a negative test; N/A = not applicable; () = 95% confidence intervals.

Injury, Int. J. Care Injured 41 (2010) 862–868

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

Accuracy of clinician-performed point-of-care ultrasound for the diagnosis of fractures in children and young adults☆

Eric R. Weinberg [1], Michael G. Tunik, James W. Tsung *

Division of Paediatric Emergency Medicine, Department of Paediatrics and Emergency Medicine, Bellevue Hospital Centre/NYU School of Medicine, New York, NY, USA

Table 4
Published studies on paediatric fracture diagnosis.

Study	Modality/bone type	Bones/*N*	Fx rate (%)	Sensitivity % (95% CI)	Specificity % (95% CI)
Hubner 2000[12]	US/long	196/146	53	89 (82–94)	90 (81–95)
Williamson 2000[41]	US/Ulna/radius[a]	52/26	30	100 (77–100)	100 (88–100)
Chen 2007[7]	US/Ulna/radius[a]	136/68	48	97 (89–100)	100 (83–100)
Moritz 2008[25]	US/all[b]	729/653	42	92.9	99.5
Moritz 2008[25]	X-ray/all[b]	729/653	42	93.2	99.8
Patel 2009[27]	US/Ulna/radius[a]	66/33	59	97 (85–100)	93 (74–99)

[a] Excluded end-of-bones/joints.
[b] Gold standard – 1 week clinical follow-up with repeat X-ray.

Ultrasound in Diagnosis of Fractures in Children: Unnecessary Harassment or Useful Addition to X-ray?

Ultraschall in der Frakturdiagnostik von Kindern: unnötige Quälerei oder sinnvolle Ergänzung zum Röntgen?

Authors J. D. Moritz[1], L. D. Berthold[2], S. F. Soenksen[2], G. F. Alzen[2]

Affiliations
[1] Department of Pediatric Radiology, UK-SH, Campus Kiel
[2] Department of Pediatric Radiology, University Clinics Gießen Marburg GmbH, Gießen

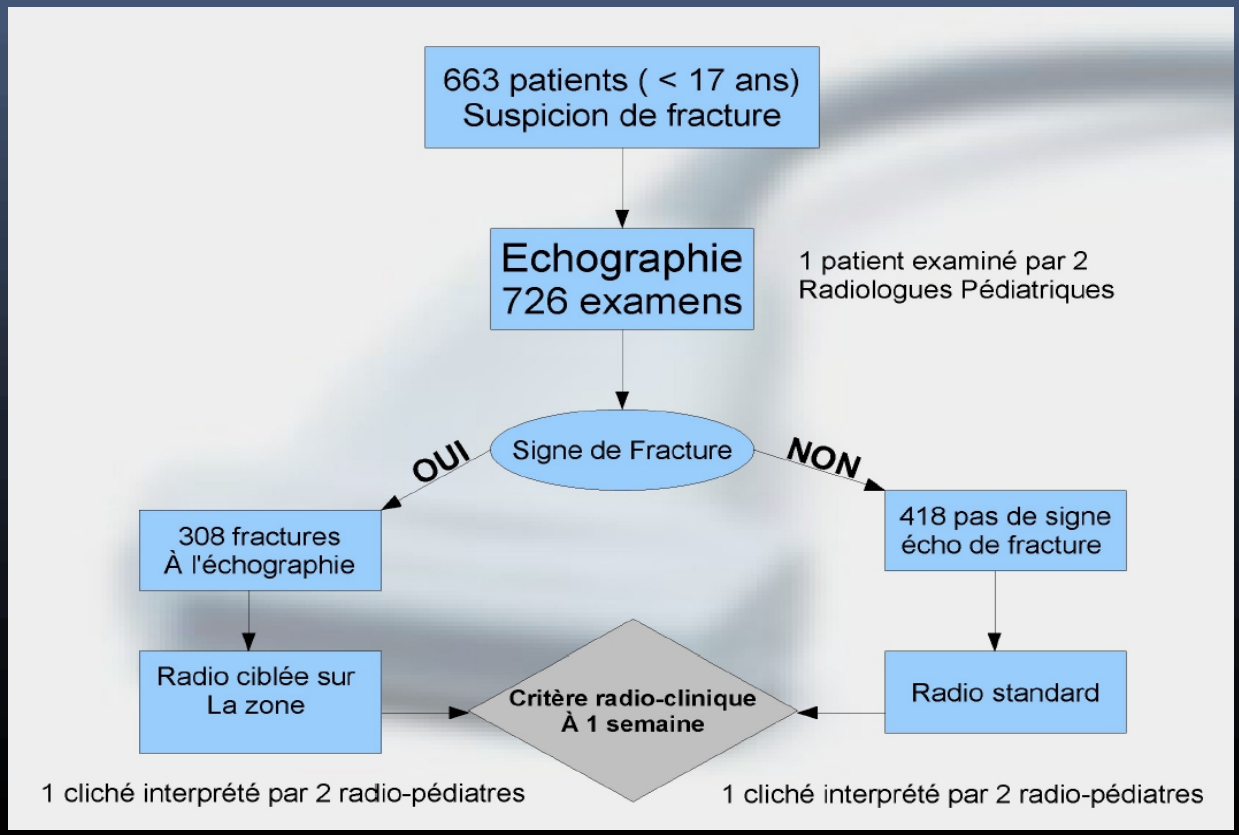
- Etude prospective sur 6 ans
- Comparaison entre radiogarphie et échographie pour le diagnostique de fracture
- 663 patients de moins de 17 ans

Ultrasound in Diagnosis of Fractures in Children: Unnecessary Harassment or Useful Addition to X-ray?

Ultraschall in der Frakturdiagnostik von Kindern: unnötige Quälerei oder sinnvolle Ergänzung zum Röntgen?

Authors J. D. Moritz[1], L. D. Berthold[2], S. F. Soenksen[2], G. F. Alzen[2]

Affiliations
[1] Department of Pediatric Radiology, UK-SH, Campus Kiel
[2] Department of Pediatric Radiology, University Clinics Gießen Marburg GmbH, Gießen



Ultrasound in Diagnosis of Fractures in Children: Unnecessary Harassment or Useful Addition to X-ray?

Ultraschall in der Frakturdiagnostik von Kindern: unnötige Quälerei oder sinnvolle Ergänzung zum Röntgen?

Authors J. D. Moritz[1], L. D. Berthold[2], S. F. Soenksen[2], G. F. Alzen[2]

Affiliations
[1] Department of Pediatric Radiology, UK-SH, Campus Kiel
[2] Department of Pediatric Radiology, University Clinics Gießen Marburg GmbH, Gießen

	diagnosed fractures on both US and X-ray	fractures exclusively on US	fractures exclusively on x-ray
cranial bones	63	3 (4%)	3 (4%)
facial bones[1]	0	0	0
clavicle	36	5 (10%)	1 (2%)
upper arm	30	3 (8%)	1 (3%)
forearm	59	2 (4%)	2 (3%)
hand	10	3 (15%)	2 (10%)
upper limb	25	0	0
lower limb	37	2 (4%)	8 (14%)
foot	4	1 (8%)	3 (25%)
rib, sternum	3	1 (14%)	1 (14%)

[1] 1 maxillary fracture was missed on both ultrasound and X-ray and identified exclusively by CT.

Table 2 Identified fractures according to the parts of the body

Ultrasound in Diagnosis of Fractures in Children: Unnecessary Harassment or Useful Addition to X-ray?

Ultraschall in der Frakturdiagnostik von Kindern: unnötige Quälerei oder sinnvolle Ergänzung zum Röntgen?

Authors J. D. Moritz[1], L. D. Berthold[2], S. F. Soenksen[2], G. F. Alzen[2]

Affiliations
[1] Department of Pediatric Radiology, UK-SH, Campus Kiel
[2] Department of Pediatric Radiology, University Clinics Gießen Marburg GmbH, Gießen

Table 4 Comparison of ultrasound and X-ray in detection of fractures

	ultrasound	x-ray
sensitivity	92.9%	93.2%
specificity	99.5%	99.8%
accuracy	96.7%	97.0%
positive PV	99.3%	99.7%
negative PV	94.5%	94.8%

THE JOURNAL OF BONE & JOINT SURGERY (Br)

Ultrasound in the diagnosis of fractures in children

Uwe Hübner, Wolfgang Schlicht, Sven Outzen, Michael Barthel, Heinrich Halsband

From the Medical University of Lübeck, Lübeck, Germany

Table I. Results of sonography compared with those of radiography in 224 suspected fractures

	Correct positive	Correct negative	Correct (total) (%)	False-positive	False-negative	False (total) (%)
Radius (85)	58	18	76 (*89.4*)	8	1	9 (*10.5*)
Ulna (54)	21	27	48 (*88.8*)	4	2	6 (*11.1*)
Tibia (19)	7	9	16 (*84.2*)	0	3	3 (*15.7*)
Humerus (20)	10	8	18 (*90.0*)	0	2	2 (*10.0*)
Femur (18)	10	7	17 (*94.4*)	1	0	1 (*5.5*)
Other (28)	12	7	19 (*67.8*)	6	3	9 (*32.1*)
Total (224)	118	76	194 (*86.6*)	19	11	30 (*13.4*)

THE JOURNAL OF BONE & JOINT SURGERY (Br)

Ultrasound in the diagnosis of fractures in children

Uwe Hübner, Wolfgang Schlicht, Sven Outzen, Michael Barthel, Heinrich Halsband

From the Medical University of Lübeck, Lübeck, Germany

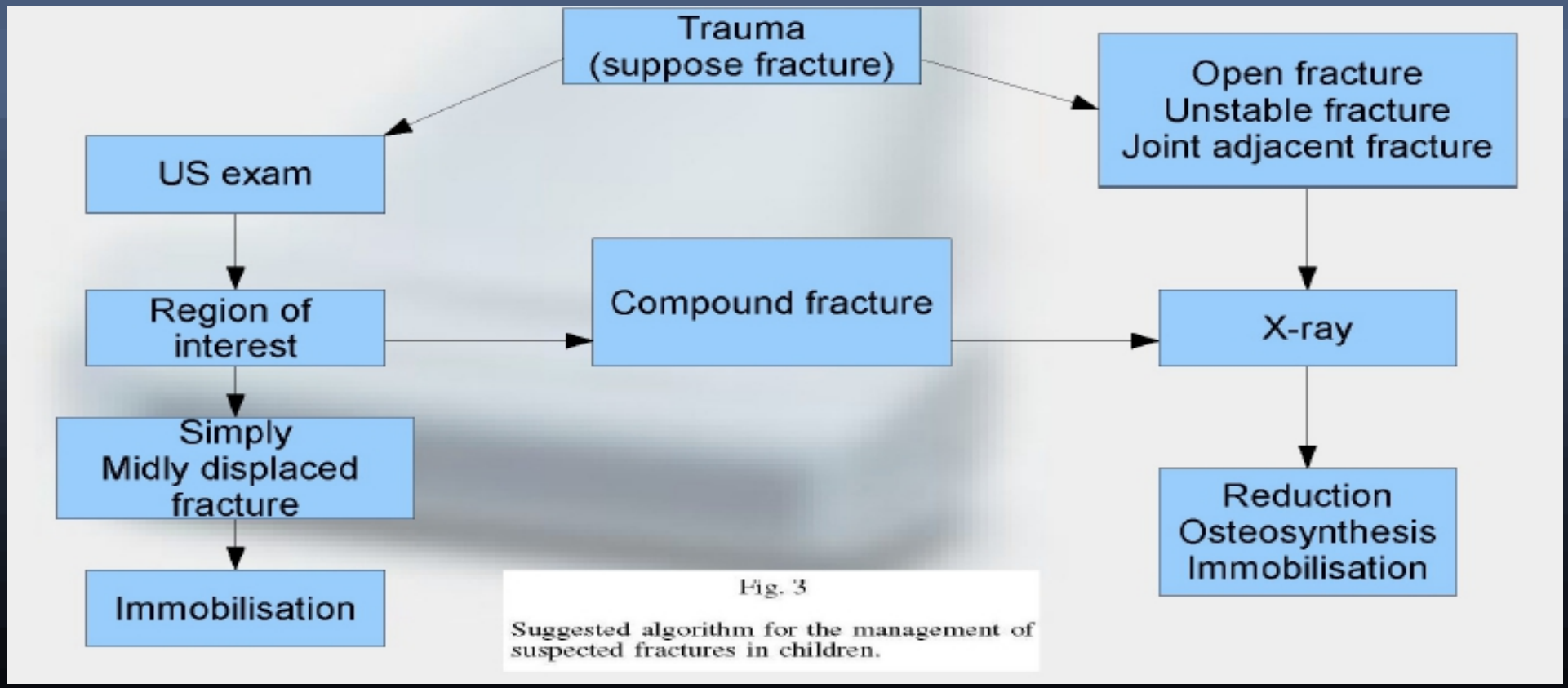


Fig. 3

Suggested algorithm for the management of suspected fractures in children.

INTERET DE L'ECHOGRAPHIE DANS LA LESION OSSEUSE MONOTRAUMATIQUE EN MEDECINE D'URGENCE

D. DELGADO, J. BRALLET, E. MANTEAUX, G. BINAULD, D. SAVARY, F.MOLLARD, JM JACQUIER, JP. PERFUS

SAMU 74 – SMUR Annecy. Centre Hospitalier de la Région d'Annecy

Tableau: Les sites lésionnels et les fractures échographiques et radiologiques

Site lésé	n	F+ Echo	F+ Rx
Cheville	14	0	0
Poignet / Avant bras	12	10	10
Epaule / Bras	8	2	2
Doigt de main	6	2	2
Métacarpe	6	3	3
Pied	6	0	1
Fémur	4	2	2
Côte	2	2	0
Total	62	21	20

- Sensibilité = 95%
- Spécificité = 100%

-2F côtes dg en écho
-1F base 5e métatarse dg en Rx

INTERET DE L'ECHOGRAPHIE DANS LA LESION OSSEUSE MONOTRAUMATIQUE EN MEDECINE D'URGENCE

D. DELGADO, J. BRALLET, E. MANTEAUX, G. BINAULD, D. SAVARY, F.MOLLARD, JM JACQUIER, JP. PERFUS

SAMU 74 – SMUR Annecy. Centre Hospitalier de la Région d'Annecy

Conclusion : Les résultats préliminaires de notre étude montrent que l'échographie pratiquée par un médecin urgentiste chez les patients présentant un mono-traumatisme osseux est un examen fiable. Elle est plus rapide que la radiographie et permet une exploration ostéologique vaste. Il nous semble que cet examen fera bientôt parti de l'arsenal diagnostic dans les services d'urgences, d'autant plus qu'il est non irradiant.

Journal Européen des Urgences

Volume 20, Issue 1, Supplement, May 2007, Pages 78–79

203

Intérêt de l'échographie dans les fractures de côtes

J.-M. Bertrand, B. Audema, M.-H. Binet

Conclusion. **–** Lorsqu'une fracture de côte est suspectée cliniquement, l'échographie met en évidence plus de fractures que la radiographie (77 vs 33 %). Leur localisation est retrouvée principalement au niveau de l'arc antérieur. Dans tout traumatisme thoracique, la radiographie reste indispensable pour éliminer un hémopneumothorax. L'échographie semble être l'examen complémentaire idéal pour porter le diagnostic de fracture(s) de côte.

Journal de Radiologie

Volume 88, Issue 10, October 2007, Pages 1597

Radiologie pédiatrique

RP-WS-30 Interet de l'echographie dans les traumatismes mineurs des membres de l'enfant

S. Abi-Khalil, S. Haddad-Zebouni, K. Hachem, S. Roukoz, N. Aoun, M. Ghossain

Conclusion

L'échographie a permis de confirmer le diagnostic de fracture dans 7 cas où elle n'était pas visible en radiographie et de l'éliminer dans un cas de radiographie douteuse. Elle est cependant opérateur dépendant et ne peut être utilisée pour le moment que dans des circonstances particulières. A l'avenir, elle pourrait remplacer la radiographie dans les traumatismes mineurs.

Echographie Journal Mensuel

Fracture du sternum

Analyse de l'étude de
Wook JIN

DIAGNOSTIC VALUES OF SONOGRAPHY FOR ASSESSMENT OF STERNAL FRACTURES COMPARED WITH CONVENTIONAL RADIOGRAPHY AND BONE SCANS

- **Wook JIN, Dal Mo Yang, Hyun Cheol Kim, Kyung Nam Ryu**

Service : Department of Diagnostic Radiology, East-West Neo Medical Center, Kyung-Hee University, Seoul, Korea,
Ecrire à : Wook Jin, Department of Diagnostic Radiology, East-West Neo Medical Center, 149 Sangil-dong, Kangdong-gu, Seoul 134-090, Korea.
E-mail: jinooki@hitel.net

J Ultrasound Med 2006; 25:1263–1268

Mot clé principal

Fracture du sternum

Mot clé accessoire

Appareil locomoteur

Spécialités

Urgentistes

- Etude menée sur 50 patients ayant une douleur de sternum
- échographie initiale, comparaison avec radiographie et scintigraphie puis relecture des échographies par 2 radiologues

Echographie Journal Mensuel

Fracture du sternum

Analyse de l'étude de
Wook JIN

DIAGNOSTIC VALUES OF SONOGRAPHY FOR ASSESSMENT OF STERNAL FRACTURES COMPARED WITH CONVENTIONAL RADIOGRAPHY AND BONE SCANS

- **Wook JIN, Dal Mo Yang, Hyun Cheol Kim, Kyung Nam Ryu**

Service : Department of Diagnostic Radiology, East-West Neo Medical Center, Kyung-Hee University, Seoul, Korea,
Ecrire à : Wook Jin, Department of Diagnostic Radiology, East-West Neo Medical Center, 149 Sangil-dong, Kangdong-gu, Seoul 134-090, Korea.
E-mail: jinooki@hitel.net

J Ultrasound Med 2006; 25:1263–1268

Mot clé principal

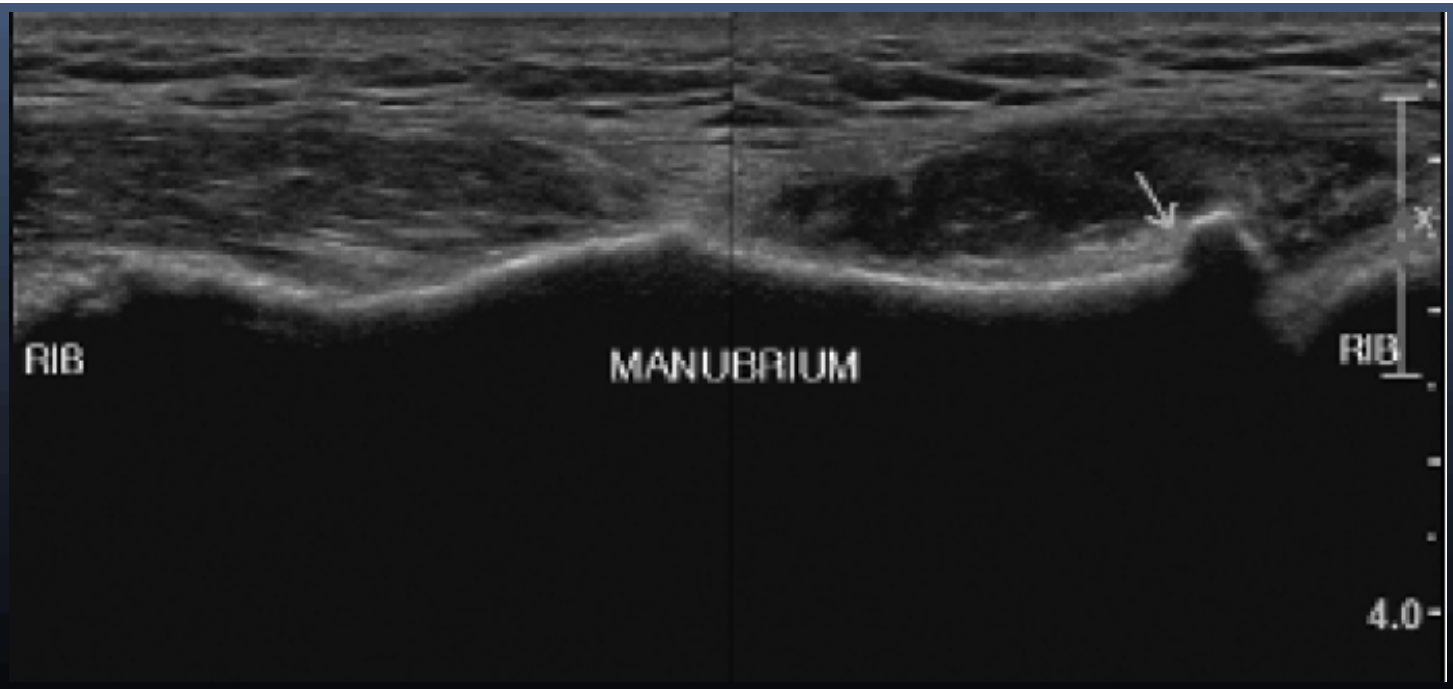
Fracture du sternum

Mot clé accessoire

Appareil locomoteur

Spécialités

Urgentistes



Fracture du sternum

Analyse de l'étude de
Wook JIN

DIAGNOSTIC VALUES OF SONOGRAPHY FOR ASSESSMENT OF STERNAL FRACTURES COMPARED WITH CONVENTIONAL RADIOGRAPHY AND BONE SCANS

- **Wook JIN, Dal Mo Yang, Hyun Cheol Kim, Kyung Nam Ryu**

Service : Department of Diagnostic Radiology, East-West Neo Medical Center, Kyung-Hee University, Seoul, Korea,
Ecrire à : Wook Jin, Department of Diagnostic Radiology, East-West Neo Medical Center, 149 Sangil-dong, Kangdong-gu, Seoul 134-090, Korea.
E-mail: jinooki@hitel.net

J Ultrasound Med 2006; 25:1263–1268

Mot clé principal

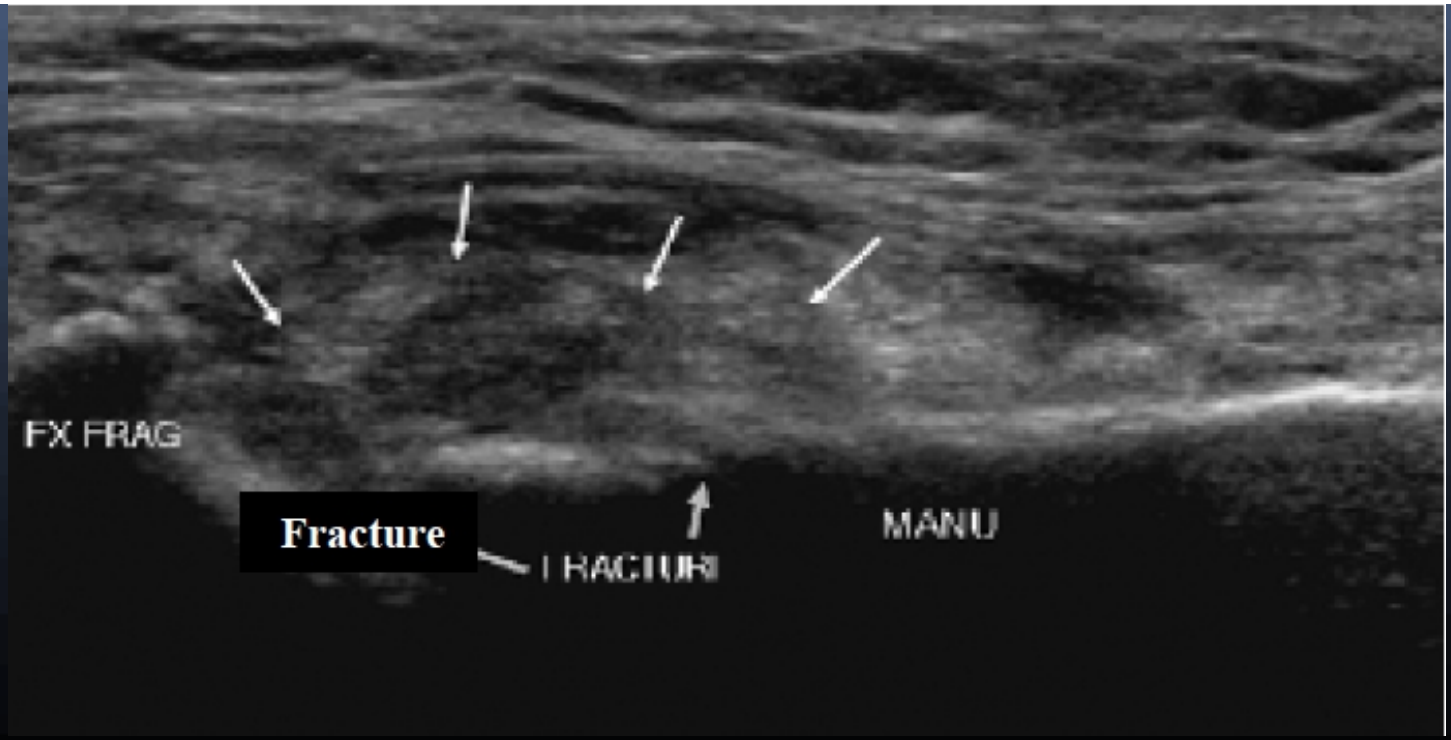
Fracture du sternum

Mot clé accessoire

Appareil locomoteur

Spécialités

Urgentistes



Echographie Journal Mensuel

Fracture du sternum

Analyse de l'étude de
Wook JIN

DIAGNOSTIC VALUES OF SONOGRAPHY FOR ASSESSMENT OF STERNAL FRACTURES COMPARED WITH CONVENTIONAL RADIOGRAPHY AND BONE SCANS

- **Wook JIN, Dal Mo Yang, Hyun Cheol Kim, Kyung Nam Ryu**

Service : Department of Diagnostic Radiology, East-West Neo Medical Center, Kyung-Hee University, Seoul, Korea,
Ecrire à : Wook Jin, Department of Diagnostic Radiology, East-West Neo Medical Center, 149 Sangil-dong, Kangdong-gu, Seoul 134-090, Korea.
E-mail: jinooki@hitel.net

J Ultrasound Med 2006; 25:1263–1268

Mot clé principal

Fracture du sternum

Mot clé accessoire

Appareil locomoteur

Spécialités

Urgentistes

La radiographie a diagnostiqué 12 fractures du sternum versus l'échographie qui en a détecté 31 soit une sensibilité 2,5 fois supérieure en faveur de l'échographie.

La scintigraphie a montré une hyperfixation chez 18 traumatisés versus 23 fractures par l'échographie, soit une sensibilité supérieure d'au moins 30% en faveur de l'échographie...

Merci de votre Attention !