Blunt severe renal trauma

Update 2016

Pr JL Descotes,
Docteur N. Terrier, Dr J A Long, Dr G Fiard

Department of Urology and renal transplantation, GRENOBLE
Fig. 5. Review of BRAl management strategies by year over the past decade.
Objectives of patient management in 2016

• Determine the best strategy to **optimize outcome and renal preservation** by immediate CT scan
  – Better comprehension and interpretation of renal lesions by **multiplanar CT Scan**

• Recognize clinical and / or radiological situations which predict renal intervention
  – In the emergency room
    • During the close follow-up
Clinical cases
Mr G.

- Direct lombar trauma
- Macroscopic hematuria
- Pain
- No shock
CT scan
Mr M.G

- No treatment
- CT one month after
  - No urinary leakage
- Scintigraphy DMSA 6 months:
  - 18 %
Mlle V.J

- Ski trauma
  - High velocity
- Shock
- Polytransfusion
- Scanner
• Complete Renal embolisation

• Reanimation

• Surgery
Oclusion aortique endovasculaire par ballonnet pour traumatisme rénal grave

Jean-Alexandre LONG (1), Jean-Luc DESCOTES (1), Nicolas TERRIER (1), Jean-Luc FAUCHERON (2), Mathieu PECHE (3), Gilles FRANCONY (4), Christian SENGEL (5), Jean-Jacques RAMBEAUD (1)

(1) Service de Chirurgie Urologique, CHU de Grenoble, Grenoble, France, (2) Service de Chirurgie Générale, CHU de Grenoble, Grenoble, France, (3) Service de Chirurgie Vasculaire, CHU de Grenoble, Grenoble, France, (4) Département d'Anesthésie-Réanimation 1, CHU de Grenoble, Grenoble, France, (5) Service de Radiologie, CHU de Grenoble, Grenoble, France,
Hervé

AVP

Surveillance

No treatment
Cas clinique 1

6 months post trauma

Scintigraphy : 19 %
Patrice

Sport accident

2 embolisation J 1 J 4

21 days hospitalisation
After 6 months

Renal function : 16 %
Who need immediate CT evaluation?
Microscopic hematuria

Adult

Minor trauma

Isolated

No hypotension or initial shock

Stable hemodynamics

= NO CT
<table>
<thead>
<tr>
<th>Author</th>
<th>Année</th>
<th>patients</th>
<th>Major lésions</th>
</tr>
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<tbody>
<tr>
<td>Nicholaisen et al</td>
<td>1985</td>
<td>221</td>
<td>0</td>
</tr>
<tr>
<td>Cass et al</td>
<td>1986</td>
<td>491</td>
<td>5</td>
</tr>
<tr>
<td>Hardeman et al</td>
<td>1987</td>
<td>365</td>
<td>0</td>
</tr>
<tr>
<td>Mee et al</td>
<td>1989</td>
<td>623</td>
<td>0</td>
</tr>
<tr>
<td>Herschhorn et al</td>
<td>1991</td>
<td>37</td>
<td>0</td>
</tr>
<tr>
<td>Eastham et al</td>
<td>1992</td>
<td>317</td>
<td>0</td>
</tr>
<tr>
<td>McAndrew et al</td>
<td>1994</td>
<td>605</td>
<td>1</td>
</tr>
<tr>
<td>Miller et al</td>
<td>1995</td>
<td>744</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3406</strong></td>
<td></td>
<td><strong>(0,2%)</strong></td>
</tr>
</tbody>
</table>

**Ultrasound control ?**
Macrosopic Hématuria

Severe trauma (blunt)
Penetrating trauma
Deceleration mechanism
poly trauma or
Initial collapsus or Shock
Children ++

Mecanism and clinical examination

Abdominal or lumbar trauma

Or Pelvic trauma

Immediate CT
Mecanisms associated with renal injury

Direct

Deceleration

Compression

Distraction
What informations do you need?
Hematoma: Volume
Associated lesions

Hematoma

Vascular extravasation

Infact parenchyma

Controlateral kidney

Congenital abnormalities or

Tumors ....
Urohematoma
Infarcted parenchyma
Controlatéral kidney
Controlatéral Kidney
Associated pathologies
Urohématoma
Cadre osseux
CT reconstructions
Grade 5
Shattered kidney
Avulsion of the renal pedicle
Thrombosis of main renal artery

Grade 1
Renal contusion
Sub capsular hematoma.

Grade 2
Non expanding perirenal hematoma or cortex laceration < 1 cm
No urinary extravasation

Grade 3
Renal cortical laceration > 1 cm
No urinary extravasation

Grade 4
Renal laceration extending into the collecting system
(contrast extravasation)
Or segmental renal or vein injury
(segmental parenchymal infarct)

Moore EE, and al, J. Trauma 1989, 29, 1664
Grade 4 and 5: heterogeneous

**Grade 4**
- Grade 4 vascular lesions
- Grade 4 Urinary extravasation

**Grade 5**
- Renal thrombosis or dissection
- Shattered kidney
- Pedicle avulsion
Evaluation of Renal Function After Major Renal Injury: Correlation With the American Association for the Surgery of Trauma Injury Scale

Gregory E. Tasian, David S. Aaronson and Jack W. McAninch*

From the Department of Urology, University of California, San Francisco and San Francisco General Hospital, San Francisco, California

Background: We propose a revision of the original 1989 renal organ injury system established by the American Association for the Surgery of Trauma based on our institution’s >25-year longitudinal experience. Our goal is to expand the current grading system to include segmental vascular injuries and ureteral pelvic injuries and to establish a more rigorous definition of severe grade IV and V renal injuries.

Methods: We retrospectively reviewed our prospectively gathered contiguous renal database of 3,580 renal injuries to describe a revised renal grading injury scale based on clinical renal salvage outcomes. We focused on the mechanism of injury, the stability of the patient, radiographic imaging, associated nonrenal injuries, and clinical salvage outcome data.
Grade 4 injuries

- All collecting system injuries including Ureteropelvic junction
- Injury of any severity and segmental arterial and venous injuries
Grade 5 injuries

- Include only renal hilar vascular injuries including thrombosis
- Best predictor of nephrectomy, patient outcome and mortality

J Trauma 2011;70: 35
Management in emergency

Reanimation / transfusion ...
Immediate CT Scan
Selective Embolisation
Surgery in failure
Intensive care unit

Collaboration
Medical and surgical teams
<table>
<thead>
<tr>
<th>Perirenal hematoma</th>
<th>Ø 3.5 cm</th>
<th>Ø Each extra cm</th>
<th>X 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vascular extravasation</td>
<td>Presence</td>
<td></td>
<td>X 13</td>
</tr>
<tr>
<td>Renal laceration</td>
<td>Lateral Vs médial</td>
<td>Simple vs complexe</td>
<td>X 3.6 X 8.4</td>
</tr>
<tr>
<td>Grade</td>
<td>3 vs 4</td>
<td></td>
<td>X 4</td>
</tr>
</tbody>
</table>

D Dugi, J. Urol, 2010, 183,582 -
Angiography

Pr Gilbert FERRETI

Polar superior artery

Active bleeding

Inferior artery

Selective coil
Trauma/Reconstruction/Diversion

Nonoperative Management Outcomes of Isolated Urinary Extravasation Following Renal Lacerations Due to External Trauma

Nejd F. Alsikafi,* Jack W. McAninch,† Sean P. Elliott and Maurice Garcia
From the Department of Urology, Mount Sinai Medical Center and University of Chicago Medical Center, Chicago, Illinois, and San Francisco General Hospital and University of California, San Francisco, San Francisco, California

Purpose: Urinary extravasation is a common finding in grade 4 and 5 renal injuries. To date there has been little written about the natural course of urinary extravasation following renal trauma. We reviewed data on the outcomes of urinary extravasation in the traumatized kidney when managed nonoperatively.

Materials and Methods: A retrospective review of the prospectively entered urological trauma database from San Francisco General Hospital was performed from 1979 to 2005. All patients with urinary extravasation after sustaining traumatic injury to the kidney as seen on computerized tomography were included in analysis.

Results: A total of 61 patients with urinary extravasation were identified. Of these patients 27 (44%) were treated operatively (26 of 27 underwent immediate and 1 of 27 underwent delayed open surgery). All (100%) operatively treated patients underwent renal exploration and repair at primary surgical management of associated abdominal and/or vascular injuries. Open surgical exploration resulted in nephrectomy in 5 of 27 (19%) patients. Of the 34 (56%) patients treated nonoperatively only 3 (9%) had persistent, nonprogressing urinary extravasation by computerized tomography 3 to 7 days after injury. An 3 (100%) of these patients underwent uncomplicated endoscopic ureteral stent placement followed by complete resolution of urinary extravasation.

Conclusions: Nonoperative management of urinary extravasation in patients sustaining traumatic injury to the kidney without associated abdominal or vascular injury is safe and results in resolution in more than 90%. In patients with persistent urinary leakage endoscopic ureteral stent placement may be needed and is successful.

Key Words: wounds and injuries; kidney; tomography, x-ray computed; urography
High Grade Blunt Renal Trauma: Predictors of Surgery and Long-Term Outcomes of Conservative Management. A Prospective Single Center Study

Cecilia Lanchon, Gaëlle Fiard, Valentin Arnoux, Jean-Luc Descotes, Jean-Jacques Rambeaud, Nicolas Terrier, Bernard Boillot, Caroline Thuillier, Delphine Ponchet and Jean-Alexandre Long*

From the Department of Urology, Grenoble University Hospital, Grenoble, France

High-grade injuries
151

Grade IV
124

Immediate surgery
0

First-line NOM
124

Angioembolization: 26
Ureteral stent: 29

Surgery
14

Reasons for surgery
Hemorrhage: 4
Temperature: 3
Urinary extravasation: 3
Compartment syndrome: 1
Pain: 2

NOM
110

Grade V
27

Immediate surgery
3

First-line NOM
24

Angioembolization: 10
Ureteral stent: 0

Surgery
13

Reasons for surgery
Hemorrhage: 4
Temperature: 2
Compartment syndrome: 3
Shattered kidney: 4

NOM
14
2004-2012: 254 patients

27 embolisations ((25 selective; 2 proximal)

Grades III: 4 cases; Grade IV: 18; Grade V: 5 cases

Success 1ère embolisation: 64%

Re embolisation: 15%

Néphrectomy: 26%

Complications:

Iterative bleeding (3), sepsis (3), pseudoanevrysm (1), devascularisation (1)
Urinary Drainage

Indications:
- Fever > 38.5
- Clots
- Renal insufficiency

Ureteral stent and bladder catheter

No impact of renal function at 6 months

Long JA., Prog.Urol, Volume 22, Issue 13, November 2012, Page 765
Fiard G. Eur Uro Volume 12, Issue 1, March 2013, Page e564
Urinary extravasation

Our results:

273 patients, 99 grade IV, 72 extravasations

JJ : 37%

Surgery : 15% des cas (6 nephrectomies, 2 renorrhaphies)
Grade 5 Surgery or Stent

Revascularisation: many descriptions

But limited time to treat: < 4 h

Always

Bilateral lesions and Solitary kidney

Piechaud Ann Urol, 1988 22, 273-277
## Results

### Surgical revascularisation

<table>
<thead>
<tr>
<th>Auteurs</th>
<th>Effectif</th>
<th>Nombre de revascularisation</th>
<th>Succès</th>
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</thead>
<tbody>
<tr>
<td>Haas</td>
<td>12</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Carroll</td>
<td>15</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Knudson</td>
<td>32</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Maggio</td>
<td>128</td>
<td>28</td>
<td>1</td>
</tr>
<tr>
<td>Cass</td>
<td>27</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Long</td>
<td>12</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

### Secondary HTA

- Haas (43%)
- Carroll (8.3%)
- Maggio (57%)
- Cass (0%)
- Stables (50%)

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Haas, C. J Trauma, 45: 557, 1998
Smith SD, J Trauma 1993, 35, 861-864
Carroll, J Trauma, 30: 547, 1990
Long JA, AFU 2004
Summary

Conservative surgery has almost disappeared

Surgery is limited to nephrectomy
• immediate if life threatening
• of differed if infection

Long followup of non surgical treatments is needed
Recommandations EAU 2011

• Polytrauma patients with associated renal injuries should be evaluated on the basis of the most threatening injury C
• In cases where surgical intervention is chosen, all associated injuries should be evaluated simultaneously C
• The decision for conservative management should consider all injuries independently C
• Following grade 1-4 blunt renal trauma, stable patients should be managed conservatively with bed-rest, prophylactic antibiotics and continuous monitoring of vital signs until haematuria resolves

• Following grade 1-3 stab and low-velocity gunshot wounds, stable patients, after complete staging, should be selected for expectant management