

**POLTAVA STATE MEDICAL UNIVERSITY
DEPARTMENT OF SURGERY №2**

INJURIES OF UROGENITAL SYSTEM ORGANS

Lecture 3

2022

LECTURE PLAN

- Kidney injuries
- Injuries of the ureters
- Bladder injuries
- Injuries of urethra
- Injuries of scrotum
- "Acute scrotum"
- Injuries of the penis
- Plastic induration of the penis

INJURIES OF KIDNEYS

- **Injuries of kidneys** are the most frequent damages of an abdominal cavity and retroperitoneal space
Ratio **of men and women - 3:1**
- Up to 70-80% of damages are combined with an injury of other organs and systems (belong to **a polytrauma**)
- It arises due to a direct injury, more often – a bump to the area of a waist, falling on a firm subject

A. Blunt traumatic injuries of kidneys (70-90%)

B. Open traumatic injuries of kidneys

INJURIES OF KIDNEYS

EUWL injurie is a precial type: *when using high energies expressiveness of damages is directly proportional to a quantity of shockwave impulses*

*When using optimum parameters the injury at **EUWL** is equal to a kidney contusion without damage of a capsule*

Damages at endoscopic interventions *(kidney catheterization, a percutaneous nephrostomy, laser contact nephrolitotripsy)*

INJURIES OF KIDNEYS

Scale of damages by AAST*:

- ***Grade I:*** contusion or non-enlarging subcapsular perirenal haematoma, and no laceration
- ***Grade II:*** superficial laceration <1 cm depth and does not involve the collecting system (no evidence of urine extravasation), non-expanding perirenal haematoma confined to retroperitoneum
- ***Grade III:*** laceration >1 cm without extension into the renal pelvis or collecting system (no evidence of urine extravasation)

*AAST-American association of a surgical trauma

INJURIES OF KIDNEYS

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INJURIES OF KIDNEYS

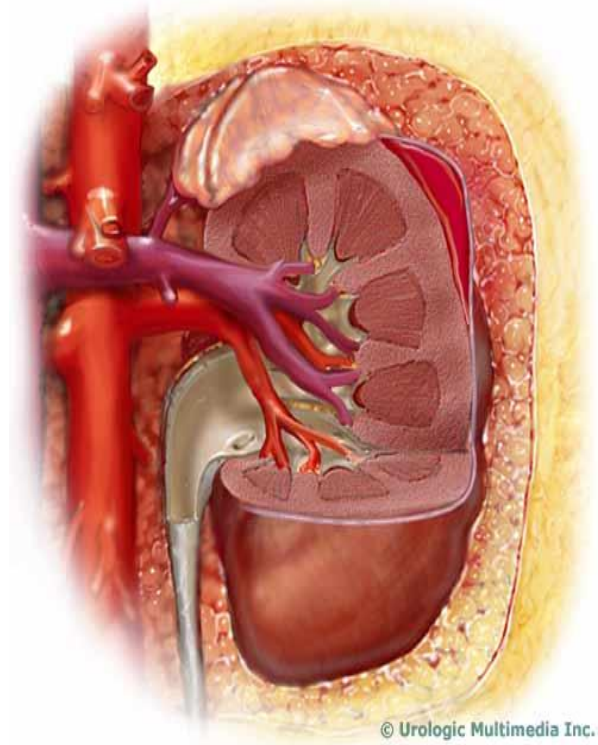
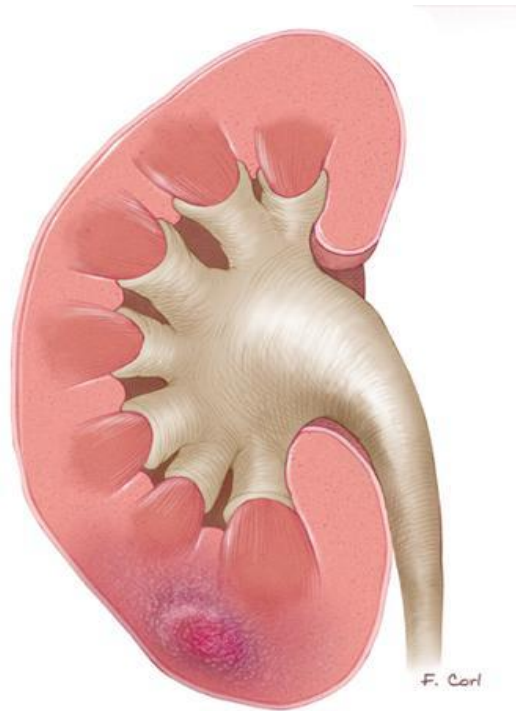
Scale of damages by AAST*:

- ***Grade IV***
- *laceration extends to renal pelvis or urinary extravasation*
- *vascular: injury to main renal artery or vein with contained haemorrhage*
- *segmental infarctions without associated lacerations*
- *expanding subcapsular haematomas compressing the kidney*
- ***Grade V***
- *shattered kidney*
- *avulsion of renal hilum: devascularisation of a kidney due to hilar injury*
- *ureteropelvic avulsions*
- *complete laceration or thrombus of the main renal artery or vein*

*AAST-American association of a surgical trauma

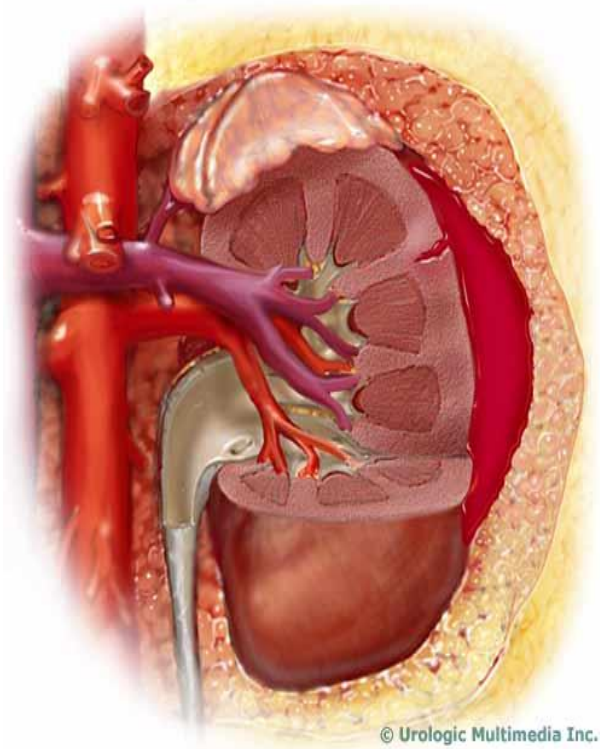
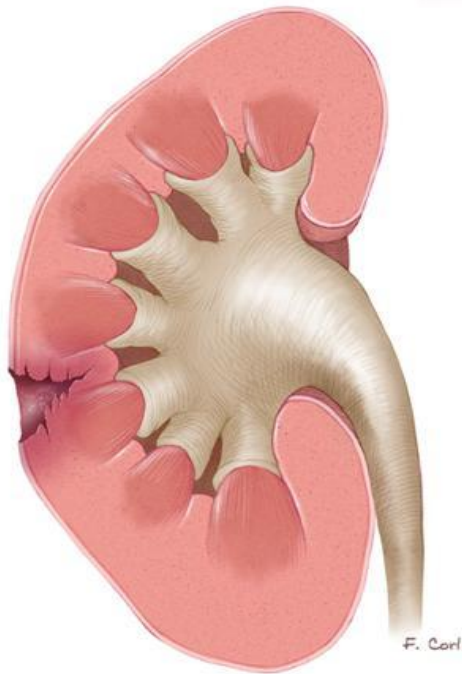
INJURIES OF KIDNEYS

Kidney contusion; subcapsular hematoma



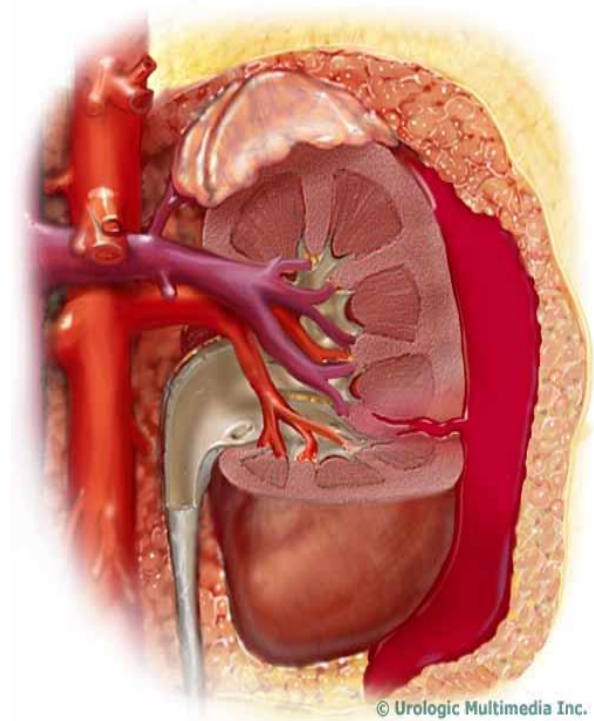
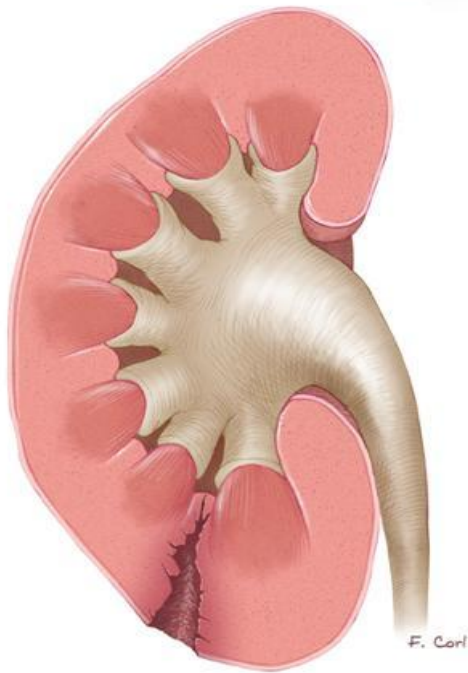
INJURIES OF KIDNEYS

Cortical laceration up to 1 cm; non-increasing perirenal hematoma



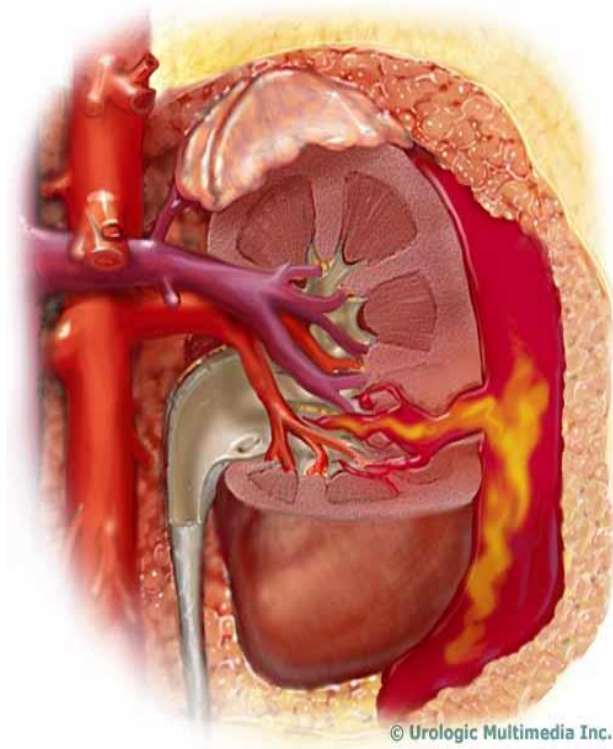
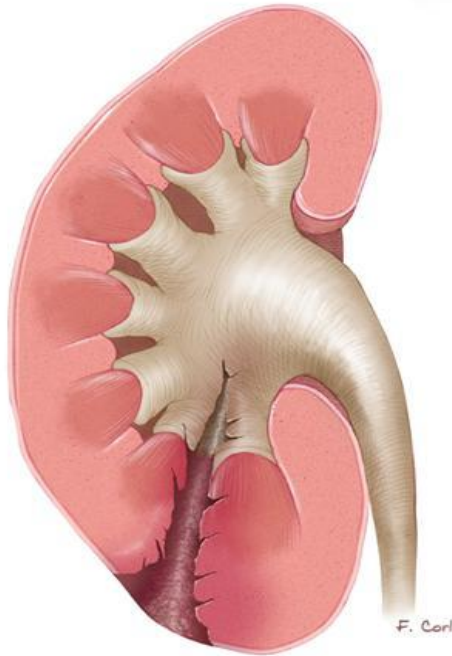
INJURIES OF KIDNEYS

Cortical laceration >1 cm without urine extravasation



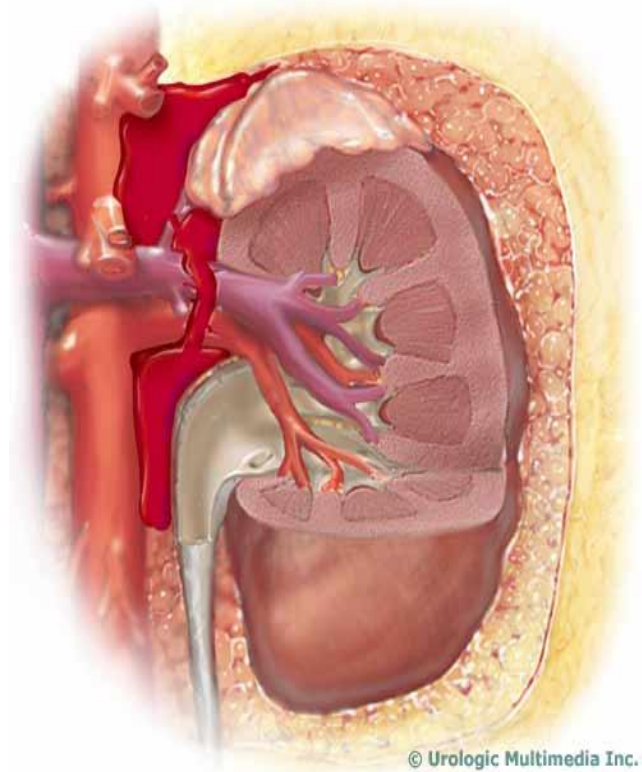
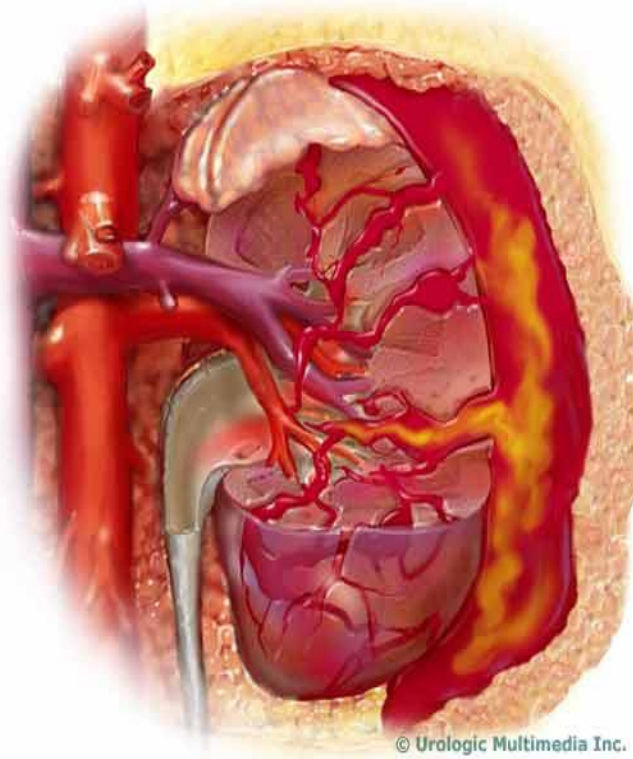
INJURIES OF KIDNEYS

Cortical laceration with damage of pyelocaliceal system and segmentar vessels with formation of an urohematoma



INJURIES OF KIDNEYS

Shattered kidney of a kidney,
damage or avulsion of vessels of a renal hilum



INJURIES OF KIDNEYS

Clinical picture of injuries of kidneys:

- ***pain*** in lumbar area
- ***a swelling*** (it is caused by a hematoma, an urohematoma)
- ***hematuria***

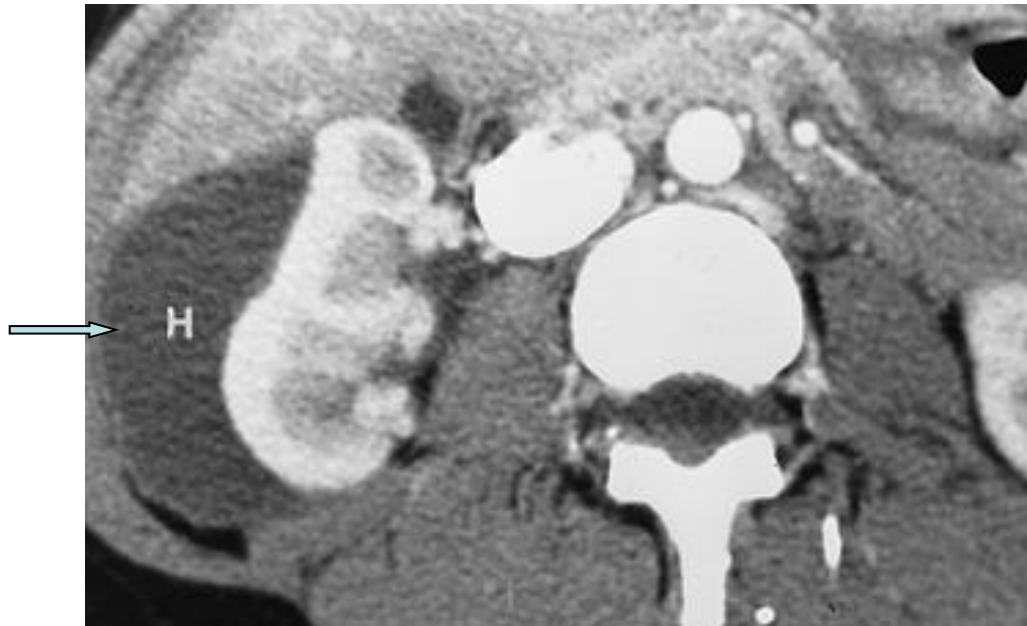
Diagnosis:

- ✓ *Blood test, urinalysis*
- ✓ *ULTRASONOGRAPHY*
- ✓ *KUB and excretory urography*
- ✓ *Computed tomography*

RUPTURE OF THE KIDNEY

COMPUTER TOMOGRAM

Subcapsular hematoma



RUPTURE OF THE KIDNEY

COMPUTED TOMOGRAM

Extravasation of urine



RUPTURE OF THE KIDNEY
EXCRETORY UROGRAM
Retroperitoneal urohematoma



INJURIES OF KIDNEYS

MEDICAL TACTICS

Conservative treatment:

- *bed regimen*
- *cold*
- *antibacterial therapy*

Indications to operative treatment:

- *the internal bleedings which are followed by increase of anemia and decrease of the blood pressure*
- *the increasing or pulsing hematoma*
- *an urine extravasation in a large volume*

DAMAGES OF URETERS

A. The blunt damages of ureters

Can be met when performing medical and diagnostic manipulations (catheterization of ureters, an ureteroscopy, a laser contact lithotripsy)

B. Open damages of ureters

Meet at gynecological operations on organs of a small pelvis and retroperitoneal space (according to references, at expanded operations - from 5 to 30%)

DAMAGES OF URETERS

MEDICAL TACTICS

In not heavy (partial) damages of an ureter treatment is conservative:

- *stenting for 3 weeks*
- *bladder catheterization for 3-5 days for prevention of a reflux*

In heavy damages of ureter treatment would be operative:

- *recovery of integrity of an ureter on a stent catheter*
- *draining of retroperitoneal space*
- *if necessary - a nephrostomy*
- *bladder catheterization for 3-5 days for prevention of a reflux*

INJURIES OF THE BLADDER

Injuries of a bladder belong to a severe injury of abdomen and pelvic organs and need emergent medical service

In 86-90% of cases road accidents, falling from height, a sport injury are the reason of the blunt injuries of a bladder

With injuries of a bladder changes of pelvic bones are found in 75-90% of patients

The probability of injuries of a bladder increases in the presence of severe injuries of organs of a pelvis and an abdominal cavity

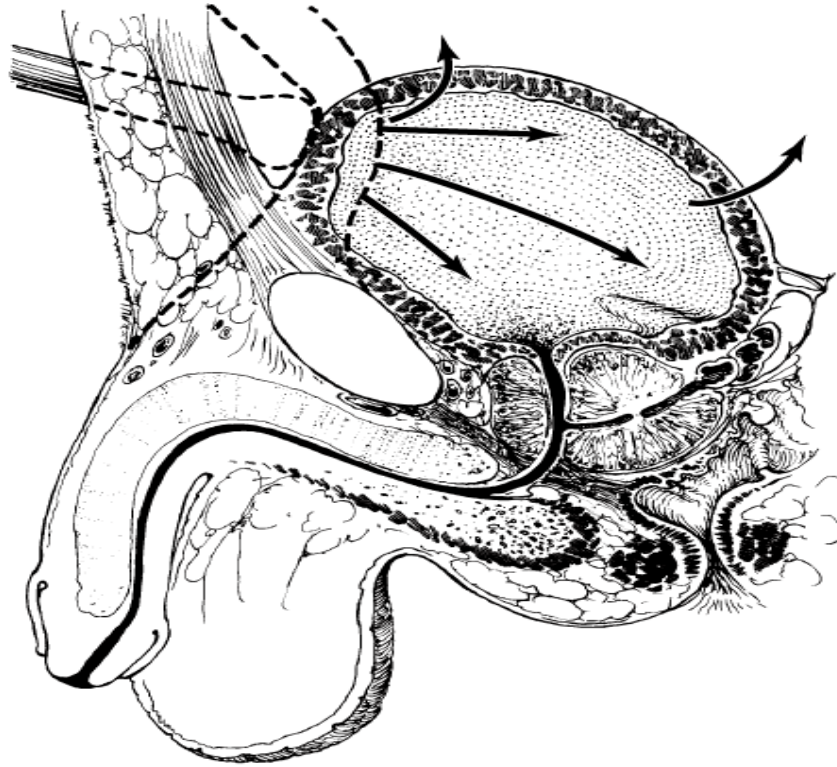
INJURIES OF THE BLADDER

A. The blunt trauma of a bladder (67-88%)

- **Intraperitoneal rupture of the bladder**
(due to stratifying of a back wall of a detrusor at sharp increase of intravesical pressure on the overfilled bladder – "a hydrodynamic blow")
- **Extraperitoneal rupture of the bladder**
(as a rule, in combination with fractures of pelvic bones)
- **Bladder separation**
(at fractures of pelvic bones with disintegrity of a pelvic ring)

B. Open injuries of a bladder (12-33%)

B. Urinary fistulas



Mechanism of intraperitoneal rupture of the bladder

INJURIES OF THE BLADDER

Scale of weight of damages of AAST:*

- Degree I *Contusion, hematoma, partial damage of a wall of a bladder*
- Degree II *Extraperitoneal (<2 cm) rupture of a wall of a bladder*
- Degree III *Extra-(>2 cm) or intraperitoneal (<2 cm) rupture of a wall of a bladder*
- Degree IV *Intraperitoneal (>2 cm) rupture of a wall of a bladder*
- Degree V *Intra-or extraperitoneal rupture of a wall of a bladder with laceration extending into bladder neck or ureteral orifice (trigone)*

*AAST-American association of a surgical trauma

INJURIES OF THE BLADDER

The clinical picture of injuries of a bladder is characterized by a combination of symptoms of injury of the bladder, other organs, pelvic bones and symptoms of early and late complications of an injury:

- **pain in the bottom of abdomen***
- **hematuria***
- **inability to urinate** (acute urine retention)*

Complication of an extraperitoneal rupture of the bladder – ***pelvic phlegmon***

Complication of an intraperitoneal rupture of the bladder - ***slow uric peritonitis***

INJURIES OF THE BLADDER

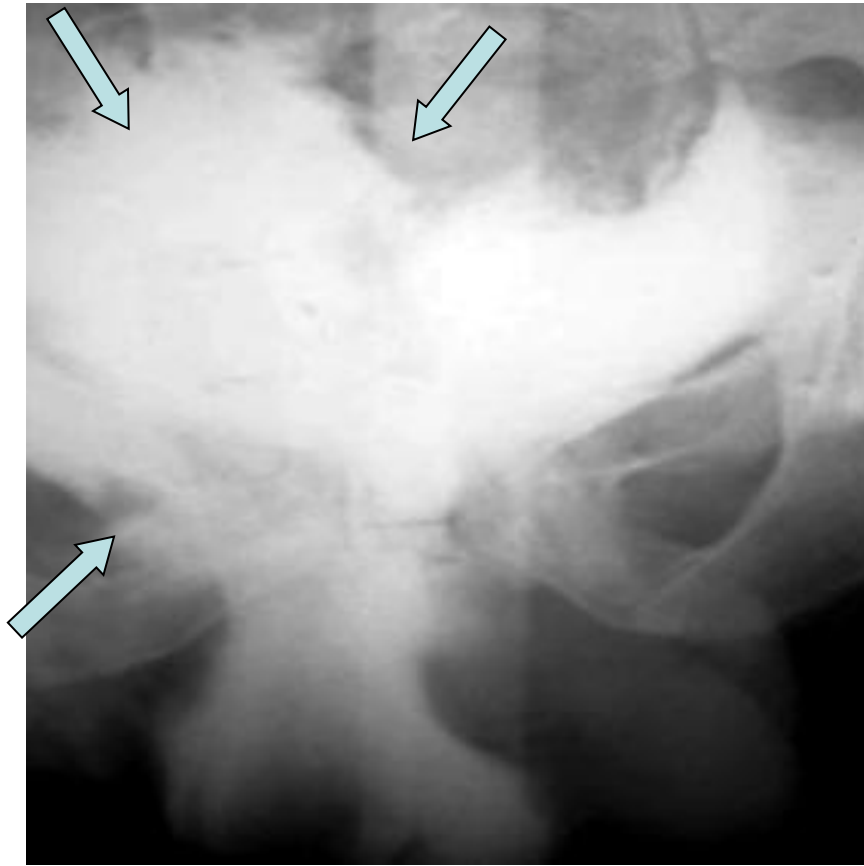
Diagnosis:

- ✓ *Blood test, urinalysis*
- ✓ *ULTRASONOGRAPHY*
- ✓ *KUB and excretory urography*
- ✓ *The ascending cystography*
- ✓ *Computed tomography*
- ✓ *Cystoscopy*

EXTRA PERITONEAL RUPTURE OF THE BLADDER

Ascending cystography

Extravasation of urine



INTRAPERITONEAL RUPTURE OF THE BLADDER

COMPUTED TOMOGRAM

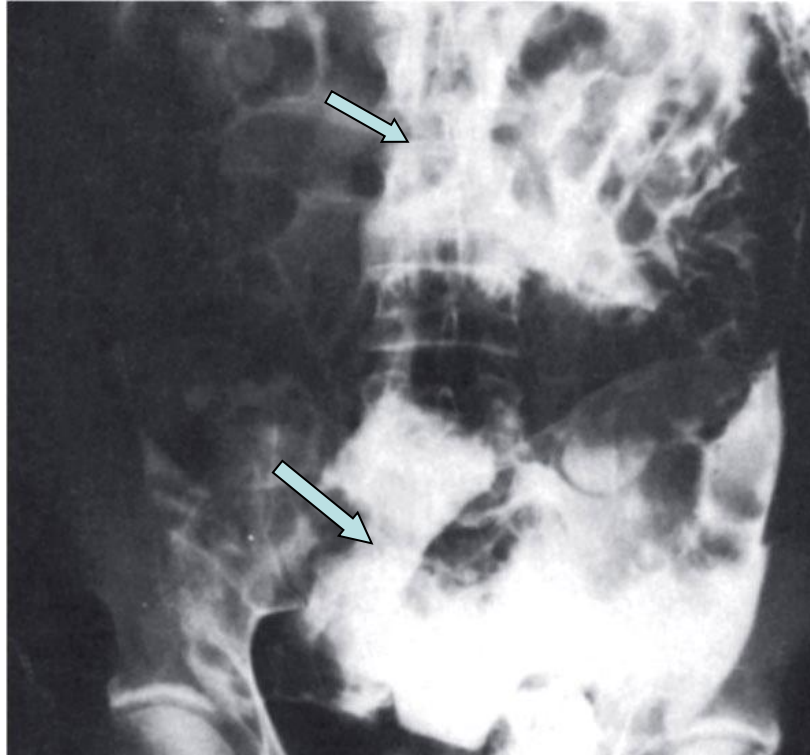
Contrast medium between intestinal loops



INTRAPERITONEAL RUPTURE OF THE BLADDER

CYSTOGRAM

Contrast medium between intestinal loops



INJURIES OF THE BLADDER

MEDICAL TACTICS

At a contusion and an incomplete rupture of the bladder – conservative treatment:

- *a constant catheter in a bladder for 7-10 days*
- *bed rest*
- *cold*
- *antibacterial therapy*

Indications to operative treatment:

- *Extra-(>2 cm) or intraperitoneal rupture of a wall of a bladder*

At an intraperitoneal rupture of the bladder – a laparotomy with obligatory drainage of a bladder and an abdominal cavity

INJURIES OF THE URETHRA

In an absolute majority cases injury of an urethra is the closed injury at fractures of pelvic bones and falling on a crotch

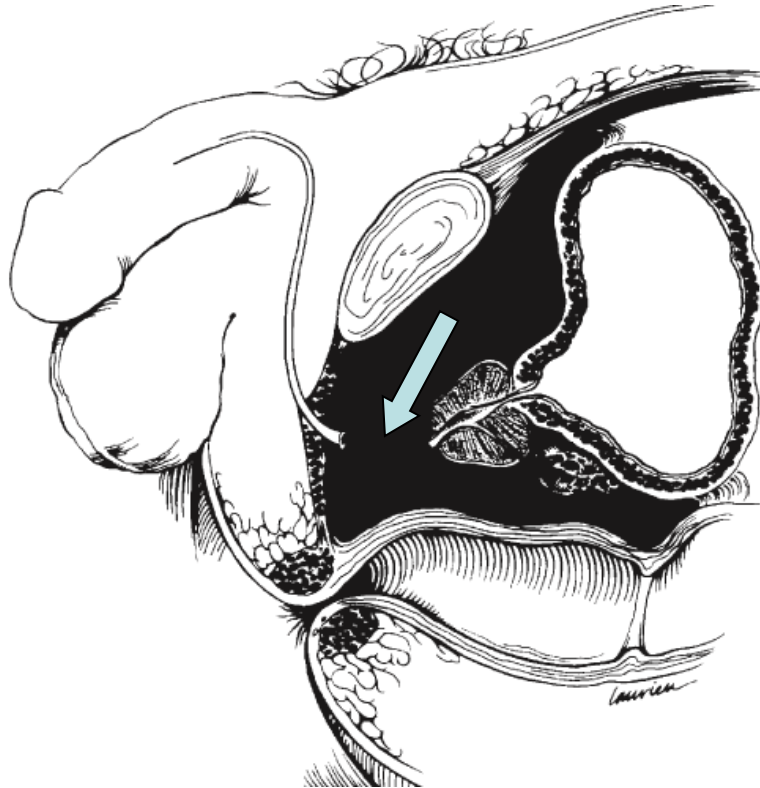
About 70% of injuries of an urethra arise at road accidents, 25% - after falling from height, 5% - as a result of the iatrogenic reasons (at catheterization, bougieunage of urethra)

Clinical picture:

- urethrorrhagia*
- hematuria*
- dysuria*
- an impossibility to void*

RUPTURE OF THE BACK URETHRA (BLADDER SEPARATION)

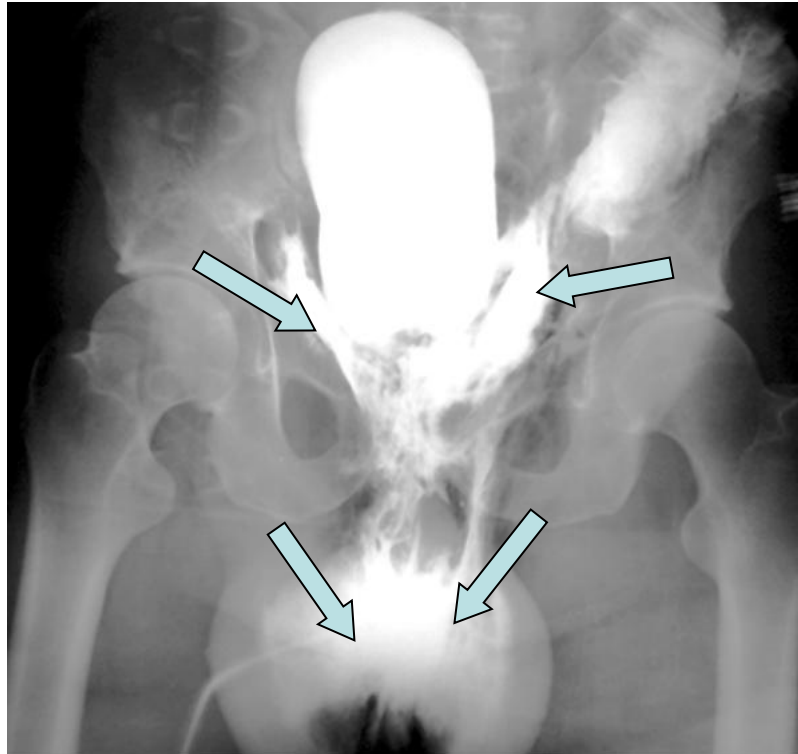
Urohematoma of a small pelvis



RUPTURE OF THE BACK URETHRA

ASCENDING URETROGRAM

Urohematoma of a small pelvis and scrotum



POSTTRAUMATIC STRICTURE OF THE URETHRA

THE DESCENDING AND ASCENDING URETROCYSTOGRAM

Stricture (obliteration) of perineal urethra



INJURIES OF THE URETHRA

MEDICAL TACTICS

At an incomplete laceration of posterior urethra *cystostoma or a constant urethral catheter for 7-10 days is indicated*

At a complete laceration of posterior urethra *the urgent or delayed urethroplasty is shown*

At a bladder separation

(a fracture of pelvic bones with disturbance of integrity of a pelvic ring, an extensive urohematoma of a small pelvis) cystostoma and drainage of an urohematoma with the subsequent urethroplasty is indicated (not earlier than 4 months after an injury)

"ACUTE SCROTUM". INJURIES OF THE PENIS

- **Acute epididymitis**
- **Torsion of vessels of a testis**
- **Torsion of hidatids of a testis**
- **Traumatic damages of albuginea of a testis without loss of a parenchyma**
- **Traumatic damages of albuginea of a testis with loss of a parenchyma and ischem of a spermatogenic epithelium**
- **Partial or full crush, testis separation**
- **Scalped wounds of a scrotum and penis**
- **Penis fracture**
- **Priapism**

"ACUTE SCROTUM"

About a half of copulative and reproductive disturbances at men develop at a children's age

One of the reasons of such disturbances is **a syndrome of "an acute scrotum"**

Diseases of organs of a scrotum take about 20% of urgent pathology of a children's age

In a structure of diseases as the reasons of urgent operative treatments in children, **acute pathology of organs of a scrotum** takes the second place after acute appendicitis

More often the problem arises among full health after the physical tension, sport games or an injury, is more rare due to infectious inflammatory diseases and allergic reactions

"ACUTE SCROTUM"

Frequency **of torsion of a testis** takes 1:500 patients in children's surgical hospitals

The peak of frequency **of torsion of a testis** is observed at teenagers – on average at the age of 16 years

If the acute pain in a scrotum arises at children till 1 year, it is almost always **testis torsion**

After 20 years the acute epididymitis is a most often pain reason in a scrotum

More seldom under **a syndrome of "an acute scrotum"** nnfringement of a hernia, a tumor, infectious diseases of a testis can mask

"ACUTE SCROTUM"

In the gestational period of 28 weeks the testis begins to descend via the inguinal channel and in 32 weeks reaches a scrotum through so called processus vaginalis which is normally obliterated on a distance from an abdominal cavity to a testis

From it there is only a small closed bag remains - tunica vaginalis which shrouds a testis in a scrotum, being fixed to a seminal cord on a back surface

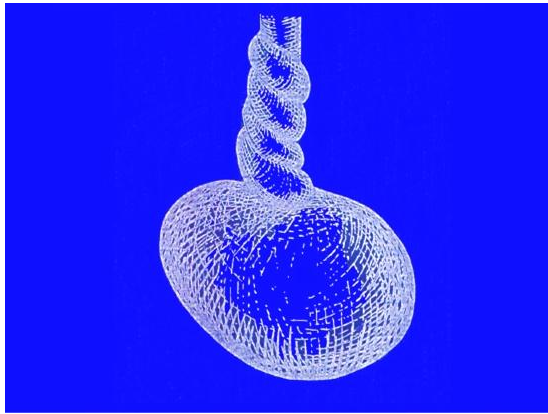
The mechanism of torsion of a testis can be connected with anatomic features of a children's age when tunica vaginalis shrouds a seminal cord above, than at adults, creating conditions for bigger mobility of an unfixed part

"ACUTE SCROTUM"

One more reason of extravaginal torsion of a testis higher than the level of scrotum which can be seen in newborns, – there can be its not omission

As twisting of a vascular bundle leads to a blood stasis, **arterial** and, eventually, venous **thrombosis** develops

*Expressiveness of an obstruction and, as a result, destructive changes in a testis, depends on torsion degree: in most cases **torsion of a testis happens on 360°***



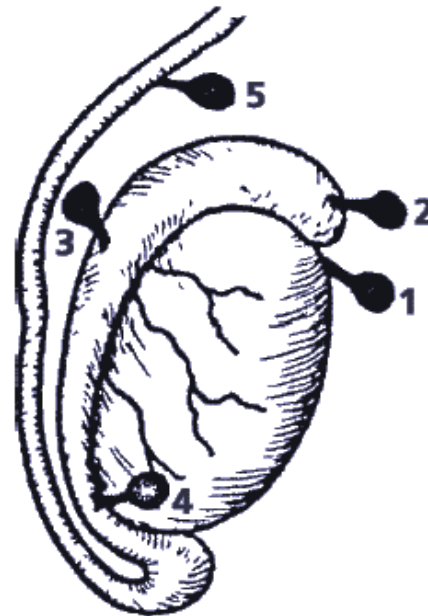
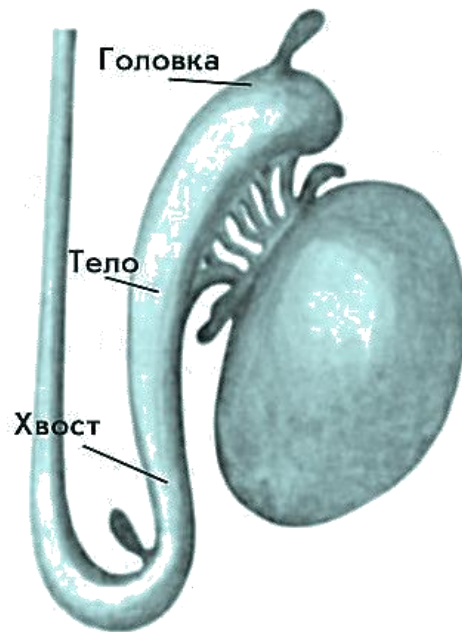
"ACUTE SCROTUM"

Difficulties of **diagnosis of torsion of a testis** are caused by the fact that the similar clinical picture is observed at, **gidatid torsion, an orchitis, an epididymitis and an injury of a scrotum organs**

At physical inspection at patients identical symptoms are observed: half of a scrotum is edematous, sharply painful at a palpation

Besides, at torsion more expressed increase and induration of a testis takes place

"ACUTE(SHARP) SCROTUM"



- 1 — гидатида яичка;
- 2 — гидатида придатка;
- 3 — верхняя гидатида отклоняющегося проточка;
- 4 — нижняя гидатида отклоняющегося проточка;
- 5 — гидатида парадидимиса

"ACUTE SCROTUM"

The key moment of diagnosis is the choice between three diagnoses which meet most often:

- **testis torsion** of which about 20% of cases of an acute pain in a scrotum
- **torsion of a gidatid** of a testis and its epididimys of which about 35-40% of urgent cases take place
- **an acute epididymitis** which takes 35% of patients

*Most informative diagnostic method is **Doppler ultrasound**, which diagnostic sensitivity is 90% and specificity – 100%*

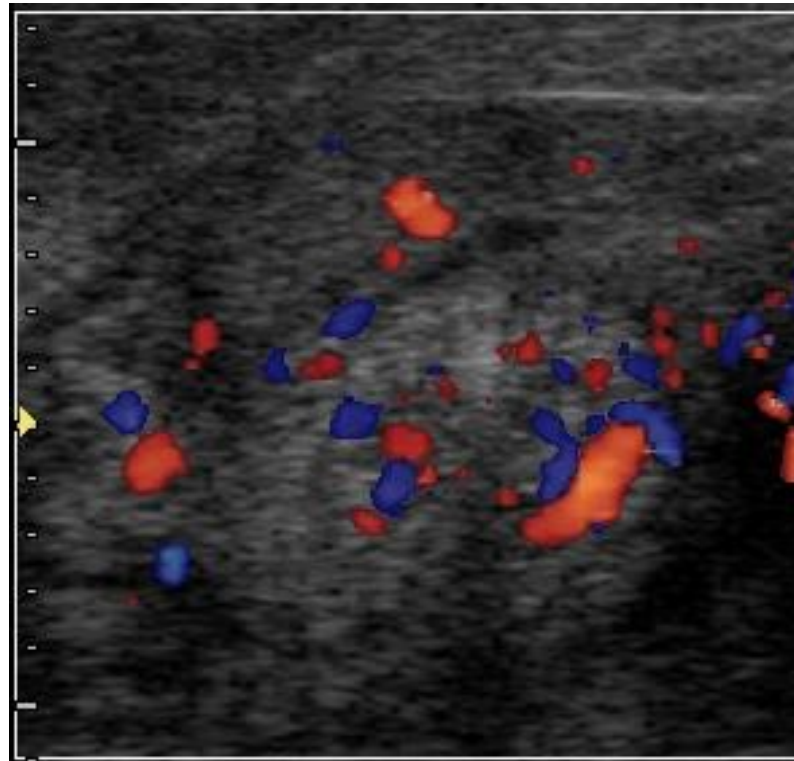
"ACUTE SCROTUM"

Before operation

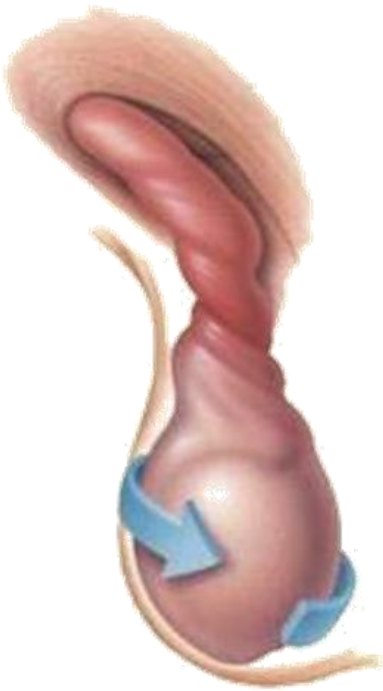


"ACUTE SCROTUM"

After operation



"ACUTE SCROTUM" MEDICAL TACTICS

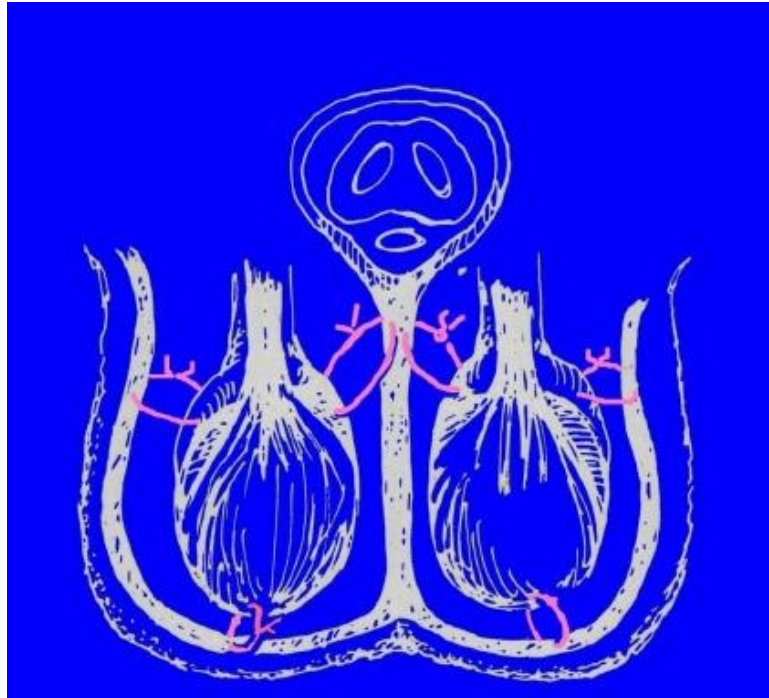


Surgical treatment – the only effective method of elimination **of torsion of a testis**

As the preventive method at adults preceding surgical intervention can be considered **attempt "to untwist" a testis**

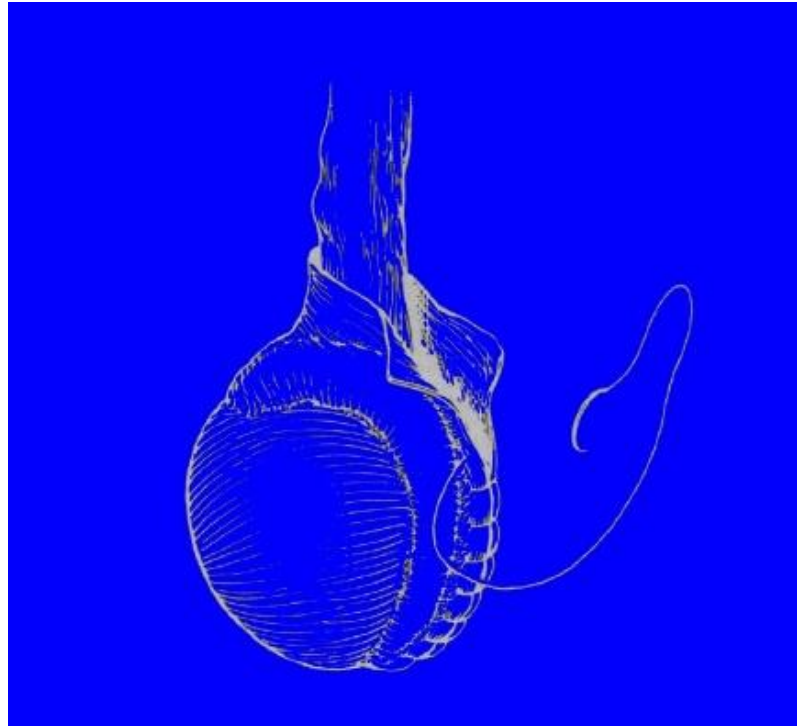
As testis torsion, as a rule, occurs in the medial direction, you should **retwist it in the lateral direction as opening the book**

"ACUTE SCROTUM"



Orchidopexy

"ACUTE SCROTUM"



Excesses of own tunica vaginalis of a testis are excised, turned out and fixed

"ACUTE SCROTUM"

According to clinical supervision if elimination of torsion happens **till 6 o'clock**, "survival" of a testis is about 80%

In 12 hours an opportunity to rescue a testis decreases to 20%

After 24 hours irreversible trophic changes of testis tissue are, as a rule, observed and surgery is removal of a testis

*Even after the emergent surgical intervention due to long (several hours) ischemia the full atrophy of a testis or partial trophic changes exerting negative impacts on cells **of Leydig** and **Sertori with** violati~~one~~ **of reproductive function** develops in 50% of cases (due to decrease in production of testosterone and imairment of a spermatogenesis)*

DAMAGE OF THE TESTIS

Scale of damages by AAST:

- Degree I *Contusion or hematoma*
- Degree II *Subclinical rupture of a tunica albuginea*
- Degree III *Rupture of a tunica albuginea with loss of a parenchyma <50%*
- Degree IV *Rupture of a tunica albuginea with loss of a parenchyma > 50%*
- Degree V *Full destruction or separation of a testis*

DAMAGES OF THE TESTIS

MEDICAL TACTICS



Sewing up tunica albuginea of a testis

PENIS "FRACTURE"

MEDICAL TACTICS



PRIAPISM

MEDICAL TACTICS



Drainage of cavernous bodies by Al-Harab

THANK YOU FOR THE ATTENTION!