Objective of this work is to evaluate interventional radiology modalities such as balloon catheter dilation (BCD) and stent insertion, as minimally invasive methods in treatment uretero-enteral anastomotic strictures.

Material and method: Retrospective study enrolled 26 patients (pts) in whom percutaneous BCD (17 pts) and metal stent implantation (9 pts) were done. Study was conducted from June 2005 till August 2007 and included total amount of 470 pts operated during 4 year period from 2003 till 2007. In 26 pts 35 ureteral units were treated, all of them in ambulatory conditions under oral analgosedation, monitored by fluoroscopy. Percutaneous BCD or stent implantation was performed in 24 pts and in 2 pts combined antegrade-retrograde approach for stent delivery, was applied. In all cases percutaneous nephrostomy (PCN) was left for 7 days period after procedure but in 6 units (5 pts) it remained permanent solution. First check up was done 7 days after by contrast media injection through nephrostomy tube prior to its extraction. Second control was done 30 days after by ultrasound exam and the last control (3 months after) by intravenous urography (IVU).

Results: In our specimen 17pts had strictures unilaterally (65.4%) and in 9 pts (34.6%) it occurred bilaterally. First check up revealed 82.7% success of BCD, in 17.3% BCD was repeated with the final success rate of 73.5% (19/26). In four pts (26.5%) after BCD reobliteration happened and PCN was left. Patent ureteral lumen was observed in 6 pts (85.7%) with stent inserted while one pt underwent surgical re intervention. No significant difference between BCD and stent insertion success rate was noticed, based upon morphological parameters (ureteral lumen diameter, pelvi-caliceal system dilatation) and serum creatinin level. Conclusion: BCD and stent insertion showed satisfactory results (following 3 months) in ureteroenteral anastomotic stricture recanalization. They include ambulatory conditions, ability to repeat procedure, without complications -excluding restenosis which finally can be surgically treated.

Key words: ureteroenteric anastomosis, strictures, ileal conduit, Mainz Pouch II, balloon dilatation, stent

INTRODUCTION

Ureteral cicatrice strictures on the spot of anastomoses of small intestine or colon at deriventional operations after radical cystectomy occur in 5-10% of cases. Due to ischemic reaction of local tissue occlusions occurs after the first surgery intervention, operation or radiotherapy and therefore results of surgery reintervention are dissatisfactory. In last decades interventional radiology proposed encouragingly minimal invasive therapy procedures in treating ureteral anastomotic strictures as well as their consequences.

Balloon catheter dilatation as initial or permanent therapy method, implantation of different types of stents on the site of stricture with antegrade, retrograde or combined approach and also percutaneous nephrostomy is today the primary choice in treatment of these strictures.

Purpose of this study is to represent our treating results of ureteroenteric strictures with interventional radiology access, to evaluate and mutually compare their efficiency and bring receiving results into comparison with contemporary literature data.

MATERIALS AND METHODS

Retrospective study includes 26 patients with stricture of uretero-ileo and uretero-sigmoid anastomoses. The study was conducted at the Institute of Urology and Nephrology and Institute of Radiology, Clinical Center of Serbia, Belgrade, in the period from June 2005 till August 2007. Antegrade balloon catheter dilatation (BCD) was performed on 17 (65.4%) patients, antegrade BCD and insertion of balloon dilatation, stent...
A stent on 7 (26.9%) patients while retrograde BCD and insertion of stent was performed on 2 (7.7%) patients. Recanalization of ureteral anastomotic stricture was practiced 3–24 months after the surgery (in average 9.2 months).

Preprocedural evaluation of patients initiated with clinical description of progressive oligurie, included ultrasonographic control of abdominal-retroperitoneum, laboratory analyses–urea, creatinine, urine sedimentation test, urinoculture and intravenous urography (IVU).

Before interventions patients were pre medicated with non steroid antirheumatics and antibiotics, per oral. All interventional radiology procedures were performed under radioscopic control in ambulance conditions. We used balloon dilatation catheters (BluMax) diameter 3-8mm, balloon length 2-5mm and inflation pressures 5-20ATM. After adequate positioning, distending balloon is inflated with dilute contrast solution pending until complete expansion using manometer syringe.

Plane contour distended balloon under the pressure 10-20ATM was deposed in situ 5 to 10 minutes. Starting from the percutaneous kidney conduit puncture, introduc- ing guide wire whereupon, preface and placing balloon catheter and inflation balloon than reformation balloon contours. All steps were fluoroscopically monitored.

In our study were inserted 9 metallic, self expanding ureteral stents from which 6 were Strecker stents, diameter 6-8mm, length 4-8cm and 3 were temporary Allium stents, diameter 8mm, length 10cm.

We used nephrostomic catheters (Bard) diameter 8F.

The patients were controlled by the nephrostomographic immediately after the intervention and after 7 days again, before taking out percutaneus nephrostomy (PCN) in patients with suitable response.

We applied the contrast through catheter during procedure (dilatation, visceral, nephrostomy) immediately after recanalization we inspected anastomoses permeability. Nephrostomy tubes were left in kidney 7 days after the procedure for eventual repeated recanalization.

BCD was successful if upwards of 70% ureteral lumen had permeability at controlled nephrostomographic 7 days after intervention. In patients with less ureteral permeability we repeated BCD after 2 months from the initial dilata- tion.

Success of the procedure of placing the metal stent was evaluated with the total expansion, reach lumen permeability and adequate position of the stent (migration didn’t occur) immediately after insertion and as well as after 7 days.

In following course patients were controlled monthly in first 3 months and later on 6 months. Examining considered kidney ultrasonography (US), biochemistry parameters for serum urea and creatinine and urinoculture. We have done IVU in patients with normal US and laboratory results after 3 months.

Excluded patients from this study were with stenosis located on ureteroneal anastomoses which have PCN initially deposed as final and only therapeutically option.

The obtained results have been statistically analyzed by Student’s t-test and McNemar’s test.

Statistically significant difference has been accepted with the 0.005 probability level.

**RESULTS**

With this retrospective study we attended and observed 470 patients in period from 2003 till 2007, performed Mainz Pouch II or ileal conduit derivation after the radical cistectomy and developed stenosis located on ureteroen- teric anastomosis in time period between 2005 and 2007.

Patients are classified, as per type of derivation, into two groups.

At the first group with Sigma Rectum Pouch (Mainz Pouch II) derivation were 220 patients, 153 (69.5%) men and 67 (20.5%) women average age 56.7 (from 29 to 71), while in the second group with ileal conduit were 250 patients, 172 (68.8%) men and 78 (31.2%) women average age 62.3 (from 34 to 75).

Overall number of patients whose ureteroneal strictures were treated with interventional radiology methods was 26 (this includes 5.5% of all patients) from which 11 of 26 (42.3%) patients were with Mainz Pouch II and 15 of 26 (58.7%) were with ileal conduit derivation.

In the group with Mainz Pouch II we treated 11 of 220 (5%) ureterosigmoid anastomotic strictures and in the group with ileal conduit derivation we treated 15 of 250 (6%) ureteroinleal anastomotic strictures.
In these 26 cases we treated 35 ureteroenteric stenosis, apropos 35 ureteral units. Thereof 17 patients (65.4%) had single anastomosis stricture and 9 patients (34.6%) had on both side ureteroenteric anastomosis stricture. From 35 strictures 14 (40%) were located on uretero-sigmo, and 21 (60%) were located on ureteroileal anastomosis.

In group with Mainz Pouch II derivation 8 (57.1%) stenotic ureteral units were treated with BCD while in 6 (42.9%) stenotic ureteral units were inserted metallic Strecker stent. In the second group with ileal conduit derivation, 18 (85.7%) ureteral units strictures were treated with BCD, while in 3 (14.3%) ureteral units was inserted temporary Allium stent. (Chart 1.1.)

The criterion for evaluating success of the procedure was recanalisation anastomotic lumen from 5-8mm, apropos treated dilatated segment is 70% or more from dilatated proximal part of ureter.

Efficiency of BCD and insertion Strecker metal stent as well as interventional radiology methods were evaluated by Mc Nemar’s test for unbound patterns in the both groups and no statistically significant difference has been found (p<0.005 ) in relation with uretersigmo or ureteroileal anastomotic stricture.

Using Student t test for unbound patterns we did not find any statically significant difference (p>0.005) in successful of recanalizations methods BCD and inserting stent methods.

BCD has equal efficiency for the both groups of patients (p<0.005).

Stent insertion was proved to be a highly efficient method of treating strictures in both groups of patients (p<0.005).

BCD and/or stent in our group of 26 patients reached 21 (80.8%).

By applying Student’s t- test no statistically significant difference has been found between the number of treated patients with Mainz Pouch II and ileal conduit derivation.

Entire efficiency of interventional radiology methods, BCD and/or stent in our group of 26 patients reached 21 (80.8%).

In our study as well as in studies of other authors2 there is a significant statistical difference between numbers of male and female because male often fail ill from invasive

---

**DISCUSSION**

Interventional radiology methods in treatment of ureteroenteric anastomoses strictures offered minimal invasive approach in ambulance conditions with possibility of repeated procedures and radicalization. Interventional radiologic treatment of anastomoses strictures is experiencing an expansion in last 10 years.

Strictures located on ureteroenteric anastomoses after ileal conduit and Mainz Pouch II derivation treated in our patients group was 5.5 % of altogether operated patients. In publications of other authors number of treating strictures after equals operated techniques is 5-10 %1,2,3.

Strictures located on ureterointestinal anastomoses mostly are consequence of tissue incompatibility between ureter and part of small intestine or colon which cause transitory epithelial metaplasion and which implicates ureteral cicatrisation.

Ischemic part of ureter after surgically treatment becomes aperistaltic, rigid or provoked by fibrotic periureteral tissues10-12. These constrictions are mostly short (up to 3 cm) but often bring to complete obstruction lumen interior and consecutive progressive hydronephrosis.

In our study as well as in studies of other authors2 there is a significant statistical difference between numbers of male and female because male often fail ill from invasive
bladder cancer * which indicates different forms of deriva-
tions of urine is used in case of males.

BCD is first interventional radiology method used in
treatment of this strictures. Success of this method is great
in first months after intervention (Ravery et all) and with
our patients it was 86%. But later (after 3 months) number
of recanalisation strictures dropped at 76.3% - and in
group of patients which BCD is repeated.

Advantage of this method is that it is easy to repeat and
deficiency is often appearance of recidivate strictures.

Metal stents are highly efficient in treatment of these
strictures, in our patients group their efficiency is 88.8%
which represent high satisfaction for method itself. Early
used "catheter based" stent such as double J stent has high
morbidity rate mostly due to reflux and great percentage
of infection.

Metal stents which are used now and which we used
represent innovation, only few trials with permanent metal
stent on this substrate have been published until now and
they like us didn’t have urosepsis, ureteral reflux or
stent migration.

In most cases ureter strictures is impossible to overcome
with BCD or stent because it was impossible to put metal
guide wire behind ureteral strictures with multiple attempt
anterograde. Therefore, PCN remains permanent solution
while in case of two patients we used retrograde approach
and successful recanalised strictures.

Stent is very useful in treating of strictures provoked by
periureteral fibrosis, e.g. those strictures where BCD is in-
sufficient. Especially efficient are covered metal stents be-
cause there is no ureteral hyperplasia and consequent
obliteration of stents’ lumen as it was the case with un-
covered stents.

CONCLUSIONS

Medical treatment of the ureteroenteric stricture in-
cludes surgical and interventional radiological options
such as percutaneous stricture dilatation and stent inser-
tion.

The main advantages of implementation of interven-
tional uroradiology methods for recanalization of ureteral
strictures are: high therapeutical progress rate, the possi-
Bility for reprocedures and therapeutical efficiency in case of
contraindications for open surgery procedures.

The results that we obtained by our research shows no
significant difference form the results that are already
published in the contemporary literature. In our study we
didn’t have any periprocedural as well as late complica-
tions, including bleeding, urinoma or urosepsis.

BCD and stent insertion showed satisfactory results
(following 3 months) in ureteroenteral anastomotic stric-
ture recanalization. They include ambulatory conditions,
ability to repeat procedure, without complications -ex-
cluding restenosis which finally can be surgically treated.

SUMMARY

INTERVENTNO RADILOŠKE METODE LEĆENJA
STRIKTURA URETERA NASTALIH NA MESTU ANAS-
TOMOZE NAKON TOTALNE CIŠTEKOMIJE KOD
MAINZ POUCH II I ILEAL CONDUIT DERIVACIJE

U našem radu smo evaluirali minimalno invazivne inter-
ventno radiološke metode u lečenju ureteroenteralnih
anastomotskih striktura. U tretmanu ovih striktura koristili
smo balon katetersku dilataciju (BKD) i insercije stenta.

Retrospektivnom studijom smo obuhvatili 26 pacijenata
i kod 17 smo uradili perkutanu BKD, a kod 9 smo inser-
tovali metalni stent. Istraživanje je sprovedeno u periodu
od juna 2005. do avgusta 2007. i njime je obuhvaćeno
ukupno 470 pacijenata koji su operisani u periodu od
smo 35 ureteralnih stenoza. Sve procedure su sprovedene
u ambulantnim uslovima sa peroralnom analgosedacijom
pacijenata, pod kontrolom radioskopije.

Perkutana BKD ili implantacija stenta je anterogradnim
putem urađena kod 24 pacijenta, dok je kod 2 pacijenta
kombinovan antero-retrogradni pristup za inersiciju stenta.
Kod svih pacijenata perkutan BKD ili implantacija stenta
ostala je trajna metoda lečenja striktura. Prvi kon-
trolni pregled je radjen 7 dana posle intervencije aplikaci-
jom kontrastnog sredstva kroz nefrostomski kateter ne-
posredno pre radjenja PCN-a.

Drugu kontrolu smo radili 30-tog dana ultrazvučnim
pregledom gornjeg urinarnog trakta, dok je poslednja kon-
trola radjena 3 meseca posle intervencije i podrazumeva-
lo je inravensku urografiju.

U našem uzorku 17 (65,4%) pacijenata je imalo jedno-
stranu strikturu, dok je 9 pacijenta imalo obstranu. Na
prvom kontrolnom pregledu 82,7% BKD je bilo uspešno.
Kod 17,3% slučajeva BKD je ponovljena. Krajnji uspeh
BKD iznosi 73,5% (19/26). Kod 4 (26,5%) pacijenta je
došlo do reobliteracije ureteroenteralnih stenoza i kod njih
je lečenje završeno trajnom PCN. Kod 6 (85,7%) paci-
jenata striktura je izlečena insercijom metalnog stenta,
dok je kod jednog pacijenta sa stentom urađena reoper-
acija.

Statističkom obradom podataka nije nadjena statistički
značajna razlika izmedju uspešnosti BKD i insercije
stenta u lečenju ovih striktura.

BKD i implantacija stenta su se pokazale kao visoko
efikasne metode u lečenju ureteroenteralnih striktura. Atr-
buti intervenzio radioloških metoda rekanalizacije su iz-
vodjene u ambulantnim uslovima, mogućnost ponavlja-
nja, niska stopa periproceduralnih, ranih i kasnih kompli-
kacijacije a u slučaju restenoe ne isključuju mogućnost
hirurške reintervencije.

Ključne reči: ureteroenteralna anastomoza, striktura,
ilealni konduit, Mainz Pouch II, balon
dilatacija, stent
REFERENCES


