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Professional paper

Comparison of the Results of Surgical and Non-surgical Treatment of Combat Urogenital Injuries in Bosnia War 1992–1995

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A B S T R A C T

Goal was to compare the results of surgical and non-surgical treatments of combat injuries of genitourinary system and to compare our data with data collected in the recent studies. The study was designed as a retrospective review of data collected in prospective databases. The data extracted from inpatients' medical records included demographics, mechanisms and type of injury, distribution of the lesions, clinical presentation features, applied diagnostic studies, treatment modalities, types of complication and results of treatment. Among 4.125 patients treated in the Mostar War Hospital, 111 had injury of genitourinary tract: 62 underwent a surgical and 49 non-surgical treatment. Mortality among operated patients was 16 (26%). Complications were noted in 47 patients (42%); in 33 (70%) were manifested as early complications, and 14 (30) as delayed ones ($p=0.006$). Among the surgically treated patients, 40 (36%) had some complication, in comparison to 8 (7.2%) patients with complications among non-surgically treated patients; which represent a statistically significant difference ($p<0.05$). In this study, there was a surprisingly high number of non-surgically treated patients, and this sub-group of UGT trauma patients had in some ways the superior treatment results in comparison with surgically treated patients. Conservatively treated patients had lower rate of complications, no mortality, and no patients with permanent disability.

Key words: *urogenital tract combat injuries, military medicine, Bosnia-Herzegovina 1992–1995 war*

Introduction

In spite of our experience in the treatment of severely traumatized patients[1,2], we found ourselves unprepared for many of the peculiarities of war injuries when the conflict in Bosnia-Herzegovina (BH) begun. We soon found that the majority of the recommendations in war--surgery textbooks were of very little value, and that we had to be creative to find our way out of a number of unexpected situations. We were unprepared to handle the high numbers of injured: in a single day in July 1992, for example, we admitted almost 450 casualties to the Sarajevo War Hospital; 40 of them with penetrating head injuries). We witnessed such types of injuries and in such extent of human body destruction that we had never before experienced. To illustrate, one experienced surgeon who had, during his previous 20-plus years in surgery operated on nine superior sagital sinus lesions, did 90-plus in the first year of war. More than half of doctors and other health care professionals left the hospital for many different reasons, and we were confronted with the lack of essentials needed to run a functional surgical service, including water, electricity, medical gases and pharmaceuticals, and virtually everything else. Understandably, of these factors induced, at the very beginning of the conflict, a state of confusion and bewilderment, intimidation and despair. Gradually, we adapted to the most trying circumstances and did what we could; some of our experiences were described elsewhere[3–5].

The purpose of this article is to compare our experience and results with those from other reports. For this,

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we chose to analyze a small segment of war injuries, those of the urogenital tract (UGT). In spite of experience gained in the treatment of causalities with the UGT injuries in the recent conflict[6–16], there is still much controversy regarding the optimal diagnostic evaluation and the choice of the therapeutic approaches. The debate is between the proponents of mandatory surgical exploration and those who advocate a non-operative management in selected patients[17,18]. We compare the results of the two approaches in the treatment in our cohort of patients with injuries of UGT.

Patients and Methods

The study was designed as a retrospective review of data collected in prospective databases. Original data were collected from Mostar War Hospital Registry, reviewed, and transferred in the protocol designed for this study. The data extracted from each inpatient medical record ranged from demographics, mechanisms and type of injury, distribution of the lesions, features of clinical presentation, applied diagnostic studies, treatment modalities, types of complications and results of treatment. A total of one hundred and eleven cases were available for review.

The cohort was composed of one hundred and eleven male patients who underwent any kind of treatment related to UGT injury in the war, from April 1992 until November 1995. From this study were excluded patients (i) for whom we were unable to retrieve all pertinent data relating to the diagnostic or the treatment procedure; and (ii) those we were not able to follow up in their post-hospital course.

To identify the lesion of the urogenital tract in a war hospital was a challenge, and it was often staged as part of multisystem injury. Diagnostic tools at our disposal were limited; we had careful physical examination, strict observation, plain and contrast radiological studies, urine analysis, and blood count and chemistry. There were no other diagnostic tools, instruments or machines, which are normally part of a contemporary urology diagnostic armamentarium. Occasionally, we were able to stage a renal injury by single shot excretory urogram. The task was more difficult if we took into consideration frequent multiplicity of injuries in all possible and imaginable relations, which more often than not blurred the clinical picture.

Based on established diagnosis and other available data, we classified patients into three groups, according to the severity of their symptoms and illness status, using a classification devised for the purpose of this study.

Class One: mild urogenital injuries. In this group, we included the patients who suffered blunt and blast non-penetrating injuries, in whom the urine discharge mechanisms were not affected, and who had stable vital signs and no injuries to other body systems or organs. Evident or occult hematuria could be present, as well as lumbar or suprapubic pain, and mild bowel movement paresis.

Class Two: moderately severe urogenital injuries. In this group we classified the patients with both penetrating and non-penetrating, single and multiple urogenital injuries, who had difficulties with urine discharge, massive hematuria and unstable vital signs.

Class Three: severe urogenital injuries. Those patients usually suffered a multisystem trauma, with a rapid deterioration of vital functions and developing a hemodynamic shock. Massive hematuria and severe difficulties with urine production and discharge was present.

Treatment protocols initially focused on stabilization of patients' vital functions and on life-support measures, rather than on palliation of patient symptoms. Opiate-based pain-killing medicaments were administrated carefully, especially during the diagnostic and observation period.

In most cases when the bacterial strain was not identified we opted for a wide-spectrum combination of the semi-synthetic penicillin with aminoglycoside, or a third generation cephalosporin.

We performed abdominal and retroperitoneal cavity explorations, with simple drainage, renal repair, partial nephrectomy or nephrectomy, painstaking bleeding control and restoration of »obliterated canals« whenever this was possible.

Early complications were mainly related to operative treatment: rebleeding, postoperative infections, urinoma and urine fistula, and they often required reoperation. Delayed complications were development of perirenal abscesses, hydronephrosis, organized hematomas, urine fistulae and urine passageways strictures. Severe malfunction of kidneys was surprisingly rare.

The results of wartime treatment of the patients with urogenital tract trauma were assessed in 2008, 12 years after last patient was treated in Mostar War Hospital. The data were extracted from the medical records of each patient. The patients were separated in two principal groups, surgically *versus* non-surgically treated patient. Each of the groups was further divided in three sub-groups, patients with excellent, good and poor treatment results. This was a classification devised solely for this research, to facilitate the assessment of the results of both surgical and non-surgical treatment.

Outcome Group One. These patients had excellent treatment results, and recovered without any complications or adverse consequences.

Outcome Group Two. These patients had satisfactory treatment results. Their recovery was prolonged and eventful, but they all eventually recovered with some minor consequences: e.g. moderately impaired renal function, difficulties with urine discharge or erectile difficulties.

Outcome Group Three. These patients either died in the early post injury period or survived with poor treatment results. Survivors had severe impediment of the renal function, urine discharge or sexual function.

Statistical analysis

Demographic, clinical and treatment variables were assessed to determine the relationship with various treatment outcomes. Fisher's exact test was used to determine the significance of differences in the treatment outcome of UGT injuries between surgically and non-surgically treated patients, when expected frequencies were lacking during the comparison of variables. The chi-squared test was used for differences between nominal and ordinal data. Data were analyzed with Statistical Package for Social Science, SPSS for Windows (13.0 SPSS Inc., Chicago, Il., USA). $p<0.05$ value was considered statistically significant.

Results

During the period from April 1992 to November 1995, 4.125 patients injured due to war-related activities were treated in the Mostar War Hospital (MWH). One hundred and eleven patients had one or more injuries of the UGT, which represents 2.7% of all casualties' admissions. The median age of the injured was 32 years; youngest patient was a 5-year old child and the oldest was 68 years old. There was no difference in age between operated and non-operated patients ($p=0.689$). All patients in this survey were male. Multisystem trauma was recorded in 35 (31.2%) patients. The mechanisms of these UGT injuries were blunt trauma (12.6%); small caliber high-velocity bullets in 25%; and fragments of fragmentation weapon (mortar shells, cannon rounds, hand grenades, and improvised explosive devices – IED) ordinance incurred in 62.1% patients.

Of the 111 injuries, 62 (55.9%) were operated and 49 (44.1%) were treated with medicaments and life-support measures only. Operative procedures were performed in all patients with bladder and urethral lesions and in 2/3 of external genitals lesions (66.7%). Of the 33 kidney injuries, 31 (93.9%) were treated surgically, and only 2 (6.1%) with non-surgical measures. Quite the opposite was noticed for perirenal urohematomata evacuation and drainage, 14 (25.5%) *vs*. 41 (74.5%), respectively.

Breakdown of the injuries incurred is summarized in Table 1, comparing our findings with data from other available studies.

TABLE 1
UROGENITAL TRACT (UGT) COMBAT INJURIES. COMPARISON OF MOSTAR WAR HOSPITAL DATA WITH DATA FROM PREVIOUS CONTEMPORARY STUDIES

Variables*	MWH[+] (%)	OIF[++] [15] (%)	Croatia[10–13] (%)	Bosnia[14] (%)	Gulf[7–9] (%)	Vietnam[5,6] (%)
Incidence	2.7	2.8	2.4–4.4	2.5	N/A	3.0–4.2
Multiple injuries	31.2	N/A	85.0–95.0	85.3	N/A	93.0
Mortality	14.4	N/A	15.6–18.0	N/A	N/A	N/A
Mechanisms						
Gunshot wound	25.3	37.0	26.0	47.1	37.0	80.0–92.0
Fragmentation weapons	62.1	50.0	66.0	52.9	62.0	8.0
Blunt and blast trauma	12.6	13.0	8.0	N/A	1.0	20.0
Type and injury distribution						
Kidney	29.5	29.6	35.0–39.6	38.5	17.0	31.0
Ureter	0.0	2.0	7.75–18.0	3.6	0.0	5.2
Bladder	5.4	13.3	11.0–15.0	13.6	17.0	15.0
Urethra	3.6	17.3	3.0–5.0	5.3	30.0	9.0
Scrotum/testicle	12.5	31.6	22.7–25.0	26.0	27.0	32.8
Penis	0.0	6.1	8.1–10.0	9.5	30.0	18.5
Type of surgical procedure						
Nephrectomy	19.35	65.5	25.0–42.5	33.8	40.0	42.0–84.0
Partial nephrectomy	4.8	N/A	N/A	N/A	N/A	N/A
Explorative surgery	4.8	N/A	N/A	N/A	N/A	N/A
Retroperitoneal hematoma evacuation	17.7	N/A	N/A	N/A	N/A	N/A
Ureter repair	0.0	N/A	N/A	N/A	N/A	N/A
Bladder repair	8.1	N/A	N/A	N/A	N/A	N/A
Uretroplasty	6.4	N/A	N/A	N/A	N/A	N/A
Orchidectomy	12.9	N/A	N/A	N/A	N/A	N/A

*Total scores exceed 100% because of UGT injuries combination (e.g. penis and urethra)
[+] MWH= Mostar War Hospital
[++] OIF = Operation Iraqi Freedom

Baseline clinical characteristics of injured patients are shown in Table 2. Age distribution in both series of patients was similar; all patients were male. The Surgically treated group had more severe sysmptoms on admission compared to the non-surgically treated group (p=0.000044), and in symptom severity one group dominate, as one can expect, the non-surgically treated patients. Physicals, laboratory and radiological examination were essentially identical for two groups of patients, only single shot contrast studies were performed more often in surgically treated patients (15 *vs*. 7; p=0.088).

Analysis of the medical treatment and pharmaceuticals used (Table 3) pointed out that life-supporting measures were applied aggressively and in an equal manner in both groups of patients. However there were some differences in the initial treatment of the two groups: in the surgically treated patients administration of narcotics (25 *vs*. 3; p=0.000032) and antibiotics, especially cephalosporines of the third generation (17 *vs*. 7; p=0.041) was significantly higher.

Major complications noted in the clinical course were summarized in the Table 4. Surprisingly, there was no significantly impaired renal function in either series. As expected, there were more rebleedings, perirenal abscesses and wound infections in the group of operated patients. Only two surgical patients developed a urine fistula and strictures were noted in four, *vs*. two in non-surgical series (p=0.414). Summative numbers are surprisingly low; both early and late complications were recorded in 40 (36%) surgically treated patients and in only eight (7.2%) non-surgically treated patient, and this difference is statistically significant (p=0.0000038).

Results of the treatment are summarized in Table 5. In our series of UGT injuries 16 (14.4%) patients died. These patients were classified as Outcome Class Three, with other poor outcome patients. All of them had multisystem injuries, all of them underwent surgery and all of them died during operative procedures or immediately in the early postoperative period. No single patient of those who expired lived more than six hours after admission.

TABLE 2
BASELINE CLINICAL CHARACTERISTICS OF INJURED PATIENTS

Variable and Procedures	Surgically treated (n=62)	Non-surgically treated (n=49)	p-value*	χ^2-test	DF
Age (average)	31.5 (5–68; range 63)	32 (11–63; range 52)	0.689	0.160	1
Male sex	62	49	Not tested	Not tested	Not tested
Symptom severity class I	7 (6.3%)	16 (14.4%)	0.061	3.522	1
Symptom severity class II	33 (29.7%)	31 (27.9%)	0.803	0.063	1
Symptom severity class III	22 (19.8%)	2 (1.8%)	0.000044	16.667	1
Laboratory tests					
Blood tests	62	49	0.217	1.523	1
Urine analysis	53	38	0.116	2.473	1
Radiology studies	54	49	0.622	0.243	1
Plain x-rays study	39	41	0.823	0.050	1
Single shot contrast study	15	7	0.088	2.909	1

*p<0.05 was considered statistically significant.
Laboratory tests*:* blood cells count, biochemistry, urine analysis

TABLE 3
MEDICAL (PHARMACEUTICAL) TREATMENT

Pharmaceuticals	Surgically treated (n=62)	Non-surgically treated (n=49)	p-value*	χ^2-test	DF
Analgesics					
Narcotics	25 (22.5%)	3 (2.7%)	0.000032	17.286	1
NSAID	39 (35.1%)	40 (38.0%)	0.910	0.013	1
Antibiotics					
Semi-synthetic penicillin	39 (35.1%)	46 (41.4%)	0.448	0.576	1
Aminoglycoside	46 (41.4%)	49 (44.1%)	0.758	0.095	1
Cephalosporins (3d generation)	17 (15.3%)	7 (6.3%)	0.041	4.167	1
Life support measures	47 (42.3%)	47 (42.3%)	1.000	0.000	1

*p<0.05 was considered statistically significant

TABLE 4
MAJOR CLINICAL COMPLICATIONS

Type of complication	Surgically treated (n=62)	Non-surgically treated (n=49)	p-value*	χ^2-test	DF
Rebleeding	5 (4.5%)	1 (0.9%)	0.102	2.667	1
Perirenal abscess	11 (9.9%)	3 (2.7%)	0.033	4.571	1
Wound infections	14 (12.6%)	0 (0.0%)	0.00018	14.000	1
Sepsis	3 (2.7%)	2 (1.8%)	0.655	0.200	1
Urine fistulas	2 (1.8%)	0 (0.0%)	0.157	2.000	1
Stenosis and strictures	4 (3.6%)	2 (1.8%)	0.414	0.667	1
Erectile dysfunction	1 (0.9%)	0 (0.0%)	Not tested	Not tested	Not tested
Impaired renal function	0 (0.0%)	0 (0.0%)	Not tested	Not tested	Not tested
Total	40 (36%)	8 (7.2%)	0.0000038	21.333	1

TABLE 5
RESULTS OF TREATMENT

Outcome	Surgically treated (n=62)	Non-surgically treated (n=49)	p-value*	χ^2-test	DF
Outcome class I	29 (26.1%)	19 (17.1%)	0.149	2.083	1
Outcome class II	14 (12.6%)	30 (27.0%)	0.016	5.818	1
Outcome class III	19 (17.1%)	0 (0.0%)	0.000066	15.897	1
Total	62	49	0.217	1.523	1

The good results of treatment were achieved in both operated and non-operated patients (29 *vs*.19; p=0.149). In the second group of patients who had the minor impediments but who are professionally and socially active, the non-operated patients dominate (14 *vs*. 30; p=0.016). Finally, poor outcome was significantly more often in surgically treated patients (19 *vs.* 0; p=0.000066).

Discussion

There are some unique characteristics of the conflict in the South-West region of Bosnia-Herzegovina (BH), which in many ways influenced medical procedures and treatment results. Firstly, there was a large number of both military and civilian casualties, which had to be cared for over a short period. Secondly, combat activities occurred in an urban environment with poorly defined frontlines, which were often stressfully close to the war hospital. Thirdly, thanks to the proximity of the battlefield and the bravery of ambulance drivers and paramedics (in less than one year eight of them were or killed or severely injured), the injured were transported from the frontline to the hospital in ten, twenty or thirty minutes at most. Fourthly, in these circumstances, a triage system was non-existent; evacuation teams brought everybody straight to the hospital, from the most severely injured, dying or dead to the merely scratched or contused people. Finally, the dominant weapons were small caliber high velocity shotgun bullets coupled with hand grenades and IED. High caliber fragmentation weapons (mortar shells, cannon rounds or aviation bombs) were used occasionally. Use of protective body armor and helmets was more often an exception than the norm. It seems to us that the circumstances of the recent terrorist acts worldwide have had many common features with our war experience. Observed from this perspective, we hope that our findings will be of interest not only for military medicine but also for authorities devising damage control strategies after outbursts of city terror.

The subject of our study, UGT combat injuries, is both broadly and poorly defined one, ranging from light contusion in the lumbar region to kidney disruption, bladder rupture or section of urine canals. We tried to overcome this problem by devising the classification of UGT injuries. Again, we are aware that this classification is descriptive and uses somewhat vague terms. However, more detailed and specific classification of injuries would stratify our data into such small groups that an analysis would be impossible.

Second problem was the multiplicity of multisystem injuries: in a retrospective analysis (and we are afraid that the same problem would be present in a prospective clinical study) it was impossible to determine to which extent UGT trauma alone was responsible for the overall clinical picture, especially in critically ill patients. When one adds the contusion and blast effects, the question becomes more difficult to answer. This dilemma was neither addressed nor solved in the literature. Finally, data from different series in this paper were collected in a different manners, some are missing and some are hard to compare and therefore should be deliberated with prudence.

This study demonstrates that 111 (2.7%) of all trauma admission sustained a UGT injury; those injuries were coupled with other system injuries in 35(31.2%) patients. The incidence of UGT corresponds with numbers from other armed conflicts over last 40 years (from Vietnam to Operation Iraqi Freedom), varying from 2.5% to 4.2%[6–16]. The number of multisystem injured patients was significantly higher in other series, ranging 85.0–93.0%[6–16]. Our data, surprisingly, were lower than in the peacetime civilian inner city trauma center, where the incidence of renal trauma was 5.7% and 94.6% patients had associated multisystem injury[20].

Weapons with less destructive power, such as those used in the Mostar area conflict, could possibly explain the lower number of multisystem injured patients in our series. To categorize the weapons used in this region during the war is not an easy task. Beside the widespread use of high velocity automatic rifles (e.g. AK-47), all other types of personal arms were used in street fighting (including hunting shotguns and occasionally real antiquities). The same can be seen if one analyzes the types of fragmentation weapons used. Large bore cannons and aviation bombs were deployed rarely, hand grenades and land mines were standard, and all forms of IED were used. IEDs were imaginative devices, such as kitchen pots stuffed with nails, screws and homemade explosives. In our series, individual firearms caused 25.3% of UGT injuries, fragmentation weapons 62.1% and blunt/blast trauma was responsible for 12.6%. In spite of the close proximity of fighting parties (two sides of a four lane avenue, Boulevard, was the favorite combat zone), stab wounds were a rarity and in this series we identified only one case.

In the category of injuries inflicted by personal firearm the numbers in our series are low, the highest being in Vietnam and Bosnia series, 80.0–92.0% and 47.1%, respectively[5,6,14]. Injuries incurred by fragmentation weapons dominated in our series, (62.1%), numbers similar to Croatian, Bosnia and Gulf war data[9–14]. Blunt and blast trauma was recorded in 12.6 patients (Table 1).

In other series, no effort was made to classify the UGT in accordance to patients' status severity, and probably with good reason; the high incidence of multisystem trauma precludes an accurate assessment. Our classification was done in a retrospective manner, after careful assessment of available data. The severely injured and critically ill patients (Symptom Severity Class Three) dominated in the group of surgically treated patients 22 (19.8%) *vs*. 2 (1.8%) non-surgically treated (p=0.000044). In Class Two the distribution in both groups was even: 33 (29.7%) *vs*. 31 (27.9%); p=0.803, and in the Class One there was a difference in favor of non-operated patients, 7 (6.3%) *vs*. 16 (14.4%), which was not statistically significant (p=0.061).

In both groups of our patients, surgically and non-surgically treated, the same simple diagnostic protocol was used, dictated by the most trying circumstances in our war hospital, under-qualified personnel, and scarce diagnostic tools at our disposal. Besides physical examination skills, the physicians had the essential laboratory tests (blood cells count and chemistry, and urine analysis) and plain x-rays studies at disposal. Twenty-two (19.8%) patients have had a single shot contrast study, 15 were operated, seven were not; and this difference is not significant one (p=0.088).

The review of data related to drug treatment revealed that life-support measures were applied in the majority of both operated and conservatively treated patients. Many would agree, especially if we compare these numbers with the number of patients in Symptom Severity Class One, that such an approach was in some cases too aggressive. We cannot deny that such criticism is justified, but we can try to explain: our war hospital was permanently understaffed, clinical skills of doctors and staff varied, and influx of casualties exceeded the personnel potentials to handle and control situation. Usually, we had no time for long deliberation or careful observation, and at those times, it seemed reasonable to over treat the patients than to overlook and miss something important. Administration of narcotics was rational and prudent, and in general, patients were satisfied with moderate doses of pain-killing medicaments. The scheme for antibiotics use was simple and dictated by stocks we had at disposal; virtually all patients received the semi-synthetic penicillin coupled with aminoglycosides. Only selected cases, about one fifth of all UGT trauma patients, were treated with cephalosporines.

The number of complications was surprisingly low; both early and late complications were recorded in 40 (36%) surgically treated patients and in only 8 (7.2%) non-surgically treated patients, and this difference is statistically significant (p=0.0000038). This deserves an explanation: surgical and intensive care facilities, surgical team accommodation, and patient wards were located altogether in the basement of a hospital under construction. The work of surgical teams was organized in long shifts of one, two or sometimes more weeks, and surgeons, anesthesiologists and other health personnel were permanently present or in the vicinity of the patients. Such organization and circumstances facilitates the permanent observation of patients, the slightest changers in patient's status could be readily detected and any condition leading to complication could be prevented.

In an environment deployed in such manner, in our series of 111 patients with UGT trauma there was 16 in-hospital deaths (14.4%), and only three patients (2.7%) with long-term working and social disability; all of them belong in the group of operated patients. Surgically treated patients dominate in the group that had good results; the opposite is true for the sub-group of patients with moderate disabilities.

Conclusion

Conservative treatment of UGT injuries is the recommended standard in urology today[20]; this is opposite to domination of the operative treatment in the war medicine doctrine[9,16,18]. In this study, we had a surprisingly

high number of non-surgically treated patients, and this sub-group had superior treatment results in comparison to the sub-group of surgically treated patients. Conservatively treated patients had a lower rate of complications, no mortality, and no permanent disability.

The most severely injured patients, with multisystem injuries, were operated on without any delay, in an attempt to save the life. Vicinity of the battlefield (500–1,000 meters) precluded triage, and in many occasions, patients were terminally ill. On the other hand, the patients with less severe conditions and isolated UGT injuries were directed to observation and conservative treatment. The permanent presence of the whole surgical team on 24--hours watch over weeks certainly facilitated the steadiness and quality of patients' observation.

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USPOREDBA REZULTATA KIRURŠKOG I NE-KIRURŠKOG LIJEČENJA UROGENITALNIH RATNIH OZLJEDA U BOSANSKOHERCEGOVAČKOM RATU 1992–1995

SAŽETAK

Cilj je bio usporediti rezultate kirurškog i ne-kirurškog liječenja ratnih ozljeda urogenitalnog sustava i usporediti naše podatke s podacima prikupljenim iz novijih studija. Metode: Studija je dizajnirana kao retrospektivni pregled podataka prikupljenih u prospektivnu bazu. Podaci su prikupljeni iz medicinske bolničke dokumentacije uključujući demografske podatke, mehanizam i vrstu ozljede, distribuciju lezije, kliničku prezentaciju, primijenjene dijagnostičke procedure, vrste liječenja, vrste komplikacija i rezultata liječenja. Rezultati: Među 4,125 pacijenata liječenih u mostarskoj ratnoj bolnici, 111 ih je imao ozljeda urogenitalnog trakta: 62 su kirurški i 49 ne-kirurški liječena. Među operiranim smrtno je stradalo 16 (26%) pacijenata. Komplikacije su zabilježene u 47 bolesnika (42%), 33 (70%) su se manifestirale kao rane komplikacije, a 14 (30%) kao kasne ($p=0,006$). Među kirurški liječenim bolesnicima, 40 (36%) je imalo neku komplikaciju, u odnosu na 8 (7,2%) ne-kirurški liječenih bolesnika, što je statistički značajna razlika ($p<0,05$). Zaključak: U ovom istraživanju, bilo je iznenađujuće veliki broj ne-kirurški liječenih bolesnika, i ova skupina pacijenata s UGT traumom su imali bolje rezultate liječenja u odnosu na kirurški liječene bolesnike. Konzervativno liječeni bolesnici su imali nižu stopu komplikacija, smrtnost nije zabilježena, kao ni trajni invaliditet bolesnika.