Revista Argentina de Clínica Psicológica
2020, Vol. XXIX, N°3, 887-894
DOI: 10.24205/03276716.2020.912

Efficacy of Transurethral Resection of Bladder Tumor for Superficial Bladder Cancer and Its Effect on The Prognosis

Rong Zhang[a], Ruixi Shen[b], Xi Liu[a], Rongyirong Zhang[a], Jun Li[c*]

Abstract

Objective: This study aimed to explore the efficacy of transurethral resection of bladder tumor (TURBT) for superficial bladder cancer (BC) and its effect on the prognosis.

Methods: We randomly assigned 116 patients with superficial BC admitted to our hospital to receive TURBT (69 cases, the research group, RG) or to receive conventional laparotomy (47 cases, the control group, CG). The two groups were compared in many terms, including the operation condition, the levels of inflammatory factors after treatment, the levels of serum indexes after treatment, treatment efficacy, the incidence of adverse reactions, the length of hospital stay, the quality of life, and the postoperative recurrence rate.

Results: The operation time, intraoperative blood loss, and the catheter dwell time were lower in the RG than in the CG ($P < 0.05$). The expression levels of interleukin 10 (IL-10), interleukin 8 (IL-8), interleukin 6 (IL-6), and tumor necrosis factor (TNF-α) were lower in the RG than in the CG ($P < 0.05$). After treatment, the level of fibrinogen (Fib) was higher in RG than in CG ($P < 0.05$), while the levels of tumor-specific growth factor (TSGF) and hepatocyte growth factor (HGF) were lower in RG ($P < 0.05$). The treatment efficacy was superior in RG than in CG ($P < 0.05$). The incidence of adverse reactions was lower in RG than in CG ($P < 0.05$). The length of hospital stay was shorter in RG than in CG ($P < 0.05$). The quality of life score was markedly higher in RG than in CG ($P < 0.05$). The recurrence rate was lower in RG than in CG ($P < 0.05$).

Conclusion: TURBT showed superior efficacy in the treatment of superficial BC, with better postoperative recovery and lower recurrence rate, which is clinically valuable.

Keywords: Transurethral resection of bladder tumor, superficial bladder cancer, efficacy, prognosis

INTRODUCTION

Bladder cancer (BC) is a prevalent malignant tumor in the urinary system, occurring on the bladder mucosa(Ericson et al, 2019). It tops the rank of incidence among genitourinary cancers in China and marks one of the ten most common tumors in the body(Mullenders et al, 2019). BC can affect individuals from any age group, including children, and its incidence increases with age (Soukup et al, 2020). Superficial BC, a frequent form of BC accounting for 70% to 80% of all BC incidence(Bryan et al, 2019), is featured with a high recurrence rate and high risks of distant metastasis and local infiltration, which seriously endangers the health and life of patients(McMullen et al, 2019). Clinical surgery is now the predominant treatment option for superficial BC(Hourigan et al, 2020). However, either of those surgical options may cause tumor residual and severe surgical trauma due to unclear identification or unfamiliar operation, resulting in higher risks of tumor recurrence and postoperative complications and lower efficacy(Xu et al, 2020; Fukuokaya and Kimura, 2019). Rapid developments of medical technology in recent years have widened the clinical application range of minimally invasive

[a]Department of Urology, The People's Hospital of Xishuangbanna Dai Nationality Autonomous Prefecture, Xishuangbanna Dai Nationality Autonomous Prefecture 666100, Yunnan Province, China.
[b]Department of Surgery, Menghai County Hospital of Traditional Chinese Medicine, Xishuangbanna Dai Nationality Autonomous Prefecture 666200, Yunnan Province, China.
[c]Department of Urology, Beijing Friendship Hospital, Capital Medical University, Beijing 100050, China.
**Address correspondence to: Jun Li*
Email: lljun@yeah.net

technology (Xu et al, 2020; Fukuokaya and Kimura, 2019). Several studies have shown that minimally invasive technology in the treatment of superficial BC can reduce complications and improve prognosis (Dhawan et al, 2019). Transurethral resection of bladder tumor (TURBT) is the most prevalent surgery for superficial BC(Taskovska et al, 2020). TURBT causes smaller trauma to the body, which promotes the recovery and reduces the recurrence rat(Lee et al, 2019). Compared with traditional open surgery, TURBT caused markedly lower surgical pain intensity in patients (Zhang et al, 2020). But the efficacy of TURBT for BC which has complex biological behaviors is still in doubt. Here we explored in detail the efficacy of TURBT for superficial BC and its effect on the prognosis, hoping to provide a reliable reference and guidance for the future clinical treatment of superficial BC.

Enrollment of research participants

A prospective analysis was performed on 116 patients with superficial BC admitted to our hospital from February 2015 to February 2017. We randomly assigned 116 patients to receive TURBT (69 cases, the research group, RG) or to receive conventional laparotomy (47 cases, the control group, CG). This study was carried out under the approval of the ethics committee of our hospital. All participants signed the written informed consent.

Inclusion and exclusion criteria

Inclusion criteria: Patients diagnosed with superficial BC by the results of pathology and imaging in our hospital; patients with complete medical data; patients in cooperation with the study procedures; patients whose immediate family members signed the informed consent.

Exclusion criteria: Patients with either abnormal cardiopulmonary function, or multiple chronic diseases, mental illness, language communication disorders; patients with a long-time administration of drugs; patients with drug allergies; patients who died during the treatment.

Methods

All surgeries were fully prepared and operated by surgeons in our hospital. Patients in the RG were treated with TURBT. In a bladder lithotomy position, patients were subjected to epidural anesthesia. We placed the resectoscope into the bladder through the urethra to identify the location, size, and shape of the tumor. Under an electrocoagulation power of 60 W and an electroresection power of 140 W, the resection was repeated. After the tumor was excised, we cauterized the normal tissues 2 cm away from the tumor and indwelled a catheter. Patients in the CG were treated with conventional laparotomy. Patients were under continuous epidural anesthesia. With the center of the abdomen as the incision center, the skin was incised, followed by the subcutaneous tissues. Then we used the electrotome to remove the tumor and its surrounding normal tissues (2 cm away), followed by catheter indwelling and then incision suture. All patients were given antibiotics after surgical treatment for 7 days. Meanwhile, chemotherapy was given once a week for 7 weeks and then twice a week. The chemotherapy lasted for 2-3 years.

Outcome measures

The two groups were compared in many terms, including the operation condition (operation time, intraoperative blood loss, and catheter dwell time), the levels of inflammatory factors after treatment (interleukin 10 (IL-10), interleukin 8 (IL-8), Interleukin 6 (IL-6), and tumor necrosis factor (TNF-α)), the levels of serum indexes after treatment (fibrinogen (Fib), tumor-specific growth factor (TSGF), and hepatocyte growth factor (HGF)), the incidence of adverse reactions, the length of hospital stay, and the postoperative recurrence rate. After 8 weeks of treatment, the treatment efficacy in the two groups was assessed based on the results of cystoscopy examination (overall response rate = (complete response + partial response)/total number of cases × 100.0%). At 1 year before and after treatment, we evaluated the quality of life of patients according to the 36-Item Short Form Survey (SF-36).

Statistical analysis

SPSS 20.0 was employed for statistical analysis (SPSS Inc., Chicago, IL, USA) and GraphPad Prism 7 for data visualization (Graphpad Software Inc., San Diego, CA, USA). The count data were expressed by the rate (%) and compared by the chi-square test (denoted by $\chi 2$). The measurement data were expressed by the mean ± standard deviation (Mean ± SD). All measurement data were normally distributed and were compared between the two groups by the independent sample t-test and compared within the group by the paired t-test. The difference was statistically significant when $P < 0.05$.

RESULTS

Comparison of the operation situation

The comparison of the operation situation revealed statistically lower operation time,

intraoperative blood loss, and catheter dwell time in the RG than in the CG ($P < 0.05$). More details are shown in Figure 1.

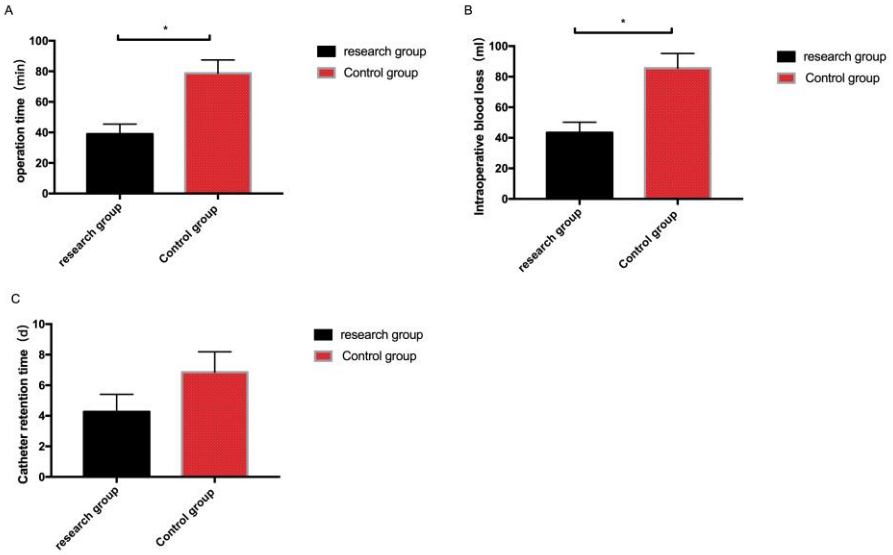

Figure 1. **Comparison of the operation situation. A.** Comparison of the operation time. **B.** Comparison of the intraoperative blood loss. **C.** Comparison of the catheter dwell time.

Comparison of levels of inflammatory factors after treatment

We detected lower levels of inflammatory factors (IL-10, IL-8, IL-6, and TNF-α) in the RG than in the CG after treatment ($P < 0.05$). More details are shown in Figure 2.

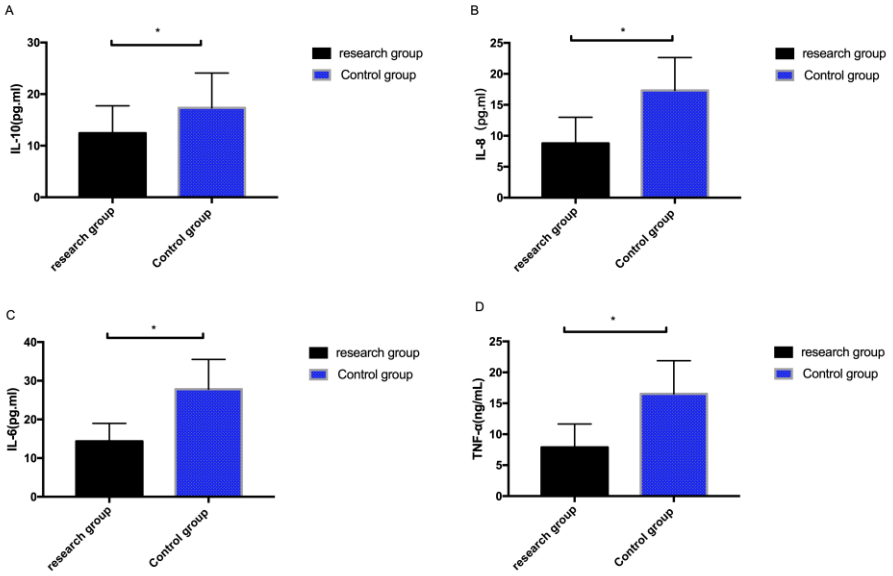

Figure 2. **Comparison of levels of inflammatory factors after treatment. A.** Comparison of the IL-10 level. **B.** Comparison of the IL-8 level. **C.** Comparison of the IL-6 level. **D.** Comparison of the TNF-α level.

Comparison of levels of serum indexes after treatment

Here we detected higher Fib level and lower TSGF and HGF levels in the RG than in the CG after treatment (all $P < 0.05$). More details are shown in Figure 3.

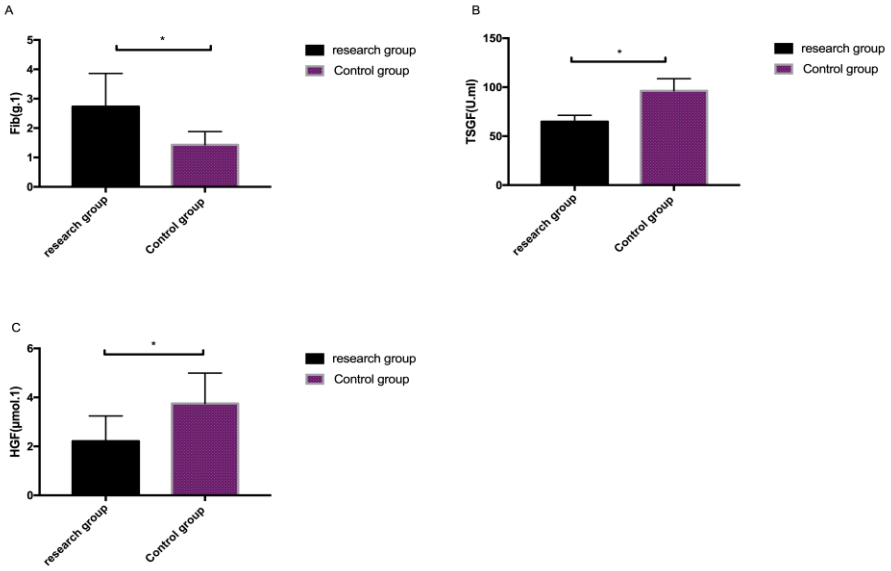

Figure 3. **Comparison of levels of serum indexes after treatment. A.** Comparison of the Fib level. **B.** Comparison of the TSGF level. **C.** Comparison of the HGF level.

Comparison of the treatment efficacy

The overall response rate was markedly higher in the RG than in the CG (79.71% vs. 57.45%), and the difference was statistically significant (P < 0.05). More details are shown in Table 1.

Table 1. **Treatment responses in the two groups**

	RG (n = 69)	CG (n = 47)	X2	P
Complete response	31(44.93)	11 (23.40)		
Partial response	24 (34.78)	16 (34.04)		
Stable disease	12 (17.39)	13 (27.66)		
Progressive disease	2 (2.90)	7 (14.89)		
Overall response rate (%)	55 (79.71)	27 (57.45)	6.688	0.010

Comparison of the incidence of adverse reactions

The incidence of adverse reactions was markedly lower in the RG than in the CG (2.90% vs. 19.15%, P < 0.05). More details are shown in Table 2.

Table 2. **Adverse reactions in the two groups**

	RG (n = 69)	CG (n = 47)	X2	P
nary tract infection	1 (1.45)	3 (6.38)		
Obturator nerve reflex	0 (0.00)	1 (2.13)		
Incision bleeding	1 (1.45)	3 (6.38)		
Bladder perforation	0 (0.00)	2 (4.26)		
Overall incidence (%)	2 (2.90)	9 (19.15)	8.601	0.003

Comparison of the length of hospital stay

The length of hospital stay was markedly shorter in the RG than in the CG, and the difference was statistically significant (P < 0.05). More details are shown in Figure 4.

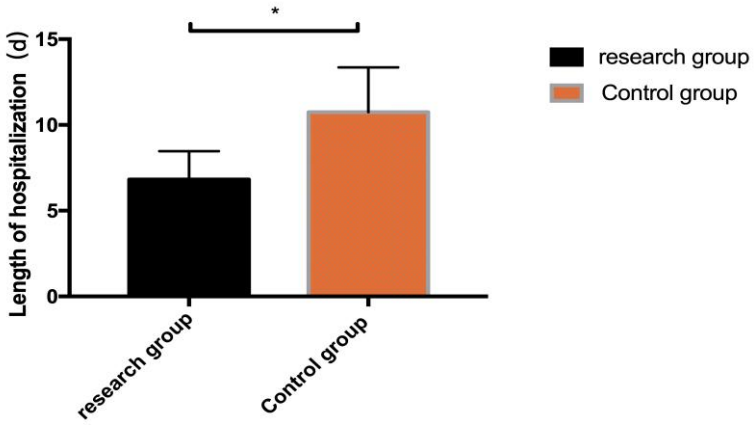

Figure 4. **Comparison of the length of hospital stay.**

Comparison of the quality of life of patients before and after treatment

The comparison of the quality of life score between the two groups before treatment showed no statistical difference (P > 0.05). After one year of treatment, the quality of life score was markedly higher in the RG than in the CG (P < 0.05). More details are shown in Figure 5.

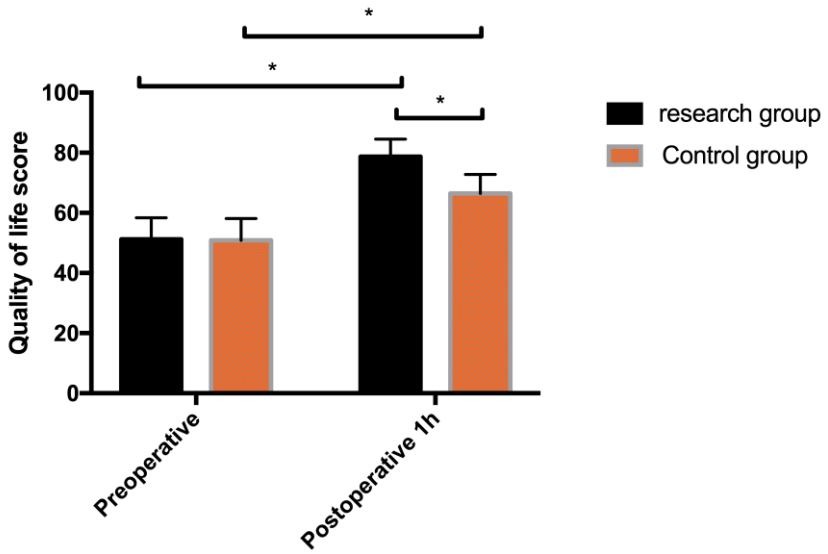

Figure 5. **Comparison of the quality of life of patients before and after treatment.**

Comparison of the recurrence of superficial BC

We followed up all patients and their families to record the 1-year and 3-year recurrence rate. The 1-year recurrence rate and the 3-year recurrence rate were markedly lower in the RG than in the CG (0% vs. 6.38%, 1.45% vs. 14.89%, all P < 0.05). More details are shown in Table 3.

Table 3. **Recurrence rate of superficial BC in the two groups**

	RG (n = 69)	CG (n = 47)		
1-year recurrence rate (%)			4.521	0.034
	0 (0.00)	3 (6.38)		
3-year recurrence rate (%)			7.870	0.005
	1 (1.45)	7 (14.89)		

DISCUSSION

As a non-muscle invasive BC, superficial BC is mainly treated with surgery, which, however, causes a high recurrence rate (Jordan et al, 2019). Conventional surgery can control the growth of superficial BC tumors, but its long-term effect is unsatisfactory(Babjuk et al, 2019), along with a high risk of complications due to the large wounds (Poletajew et al, 2019). Continuous advancements of minimally invasive technology have enhanced its importance in clinical practice (Raj et al, 2019). The study by Akand M(Akand et al, 2019) revealed that TURBT can address the disadvantages of conventional surgery to promote the recovery of patients. However, some patients treated with TURBT may develop recurrence BC due to the complex and variable bladder tumors (Del et al, 2019). To explore the efficacy of TURBT for superficial BC and its effect on the prognosis, we conducted a series of studies here.

In the present study, the operation time, intraoperative blood loss, and catheter dwell time were lower in the RG than in the CG, indicating that TURBT can reduce the amount of intraoperative bleeding and shorten the catheter dwell time and the operation time, as well as promote the recovery of patients. TURBT is characterized by small trauma, shorter operation time, and faster recovery, which can be repeated many times(Li n et al, 2020). The study by Ouzaid I(Ouzaid et al, 2019) proposed that TURBT is the gold standard for the treatment of superficial BC. Suh J(Suh et al, 2019) suggested that TURBT can be used not only for BC treatment but also for cancer staging and grading. The above-mentioned studies all confirm the results of this study. The efficacy of TURBT for superficial BC has been confirmed in many studies, so here we will not bother to repeat this too much (Kimura et al, 2019). Here we selected representative inflammatory factors (IL-10, IL-8, IL-6, and TNF-α) as outcome measures. We detected markedly lower levels of inflammatory factors, higher Fib level, and lower TSGF and HGF levels in the RG than in the CG. Fib is a glycoprotein synthesized and secreted by liver cells, involved in blood coagulation and hemostasis(Martini et al, 2020). The increase in Fib level in the RG reflected better coagulation function and less bleeding. TSGF is the collective name of several internationally recognized carbohydrates and metabolites (lipoproteins, enzymes, amino acids) related to the growth of malignant tumors(Horváth et al, 2019). HGF is a multifunctional factor that can stimulate the proliferation of hepatocytes and regulate the growth, movement, and morphology of a variety of cells such as epithelial cells, hematopoietic cells, and vascular endothelial cells(Torres et al, 2019). The decrease in TSGF and HGF levels in the RG reflected the progression of the tumor, suggesting that TURBT is superior in treating superficial BC.

We initially discussed the mechanism of TURBT in treating superficial BC and then assessed the treatment responses and adverse reactions in the two groups to evaluate the efficacy of TURBT. The results showed that TURBT led to better efficacy and a lower incidence of adverse reactions than conventional laparotomy. TURBT can completely remove the bladder wall at the tumor site and the surrounding normal bladder tissues 2 cm away from the tumor by electrical resection, and it can be repeated many times (Kida et al, 2020). We speculate that TURBT is safe because the incision made by TURBT is deep enough to reach the base layer to avoid tumor metastasis on the surface of the adipose tissues, besides, the surrounding adipose tissue is vaporized during the operation. Therefore, TURBT has smaller trauma, a wide range of applications, and better surgical efficacy compared to conventional laparotomy. In the present study, patients in the RG had a markedly shorter length of hospital stay and markedly better quality of life after treatment than patients in the CG, indicating that TURBT can effectively enhance the recovery and quality of life of patients. We followed up all patients and found that the 1-year and 3-year recurrence rates were both lower in the RG than in the CG, which further confirms the therapeutic effect of TURBT and suggests that TURBT can prolong the survival time of patients.

This study is subject to some problems due to the limited experimental conditions. Here we only discussed the value of TURBT in the treatment of superficial BC, but did not conduct basic experiments to identify the exact mechanism of action. Besides, due to the short experimental period, we did not analyze the efficacy of other minimally invasive surgeries. We will address those deficiencies to perfect this study and to obtain the most accurate results.

In summary, TURBT showed superior efficacy in the treatment of superficial BC, with better postoperative recovery and lower recurrence rate, which is clinically valuable.

REFERENCES

[1] Akand M, Muilwijk T, Raskin Y (2019). Quality Control Indicators for Transurethral Resection of Non–Muscle-Invasive Bladder Cancer. Clinical genitourinary cancer, 17(4): e784-

e792.doi: 10.1016/j.clgc.2019.04.014

[2] Babjuk M, Burger M, Compérat E M (2019). European Association of Urology guidelines on non-muscle-invasive bladder cancer (TaT1 and carcinoma In Situ)-2019 update. European urology. Doi: 10.1016/j.eururo.2019.08.016

[3] Bryan R (2019). Correspondence: Association between treatment of superficial bladder cancer and 10‐year mortality in older adults with multiple chronic conditions. Cancer, 125(4): 652-652. doi: 10.1002/cncr.31894.

[4] Del F G, Barchetti G, De E B (2019). Prospective Assessment of Vesical Imaging Reporting and Data System (VI-RADS) and Its Clinical Impact on the Management of High-risk Non-muscle-invasive Bladder Cancer Patients Candidate for Repeated Transurethral Resection. European urology.doi: 10.1016/j.eururo.2019.09.029

[5] Dhawan V, Karan S C, Singh G (2019). ROLE OF EARLY SECOND TURBT IN DETECTION OF RECURRENCE AND DISEASE PROGRESSION IN T1 TCC BLADDER. Indian Journal of Applied Research, 9(10).

[6] Ericson K J, Murthy P B, Bryk D J (2019). Bladder-Sparing Treatment of Nonmetastatic Muscle-Invasive Bladder Cancer. Clinical advances in hematology & oncology: H&O, 17(12): 697.

[7] Feng R (2020). Long-term Effect of Transurethral Resection of Bladder Tumor Combined with Intravesical Instillation of Pirarubicin on Immune Function in Superficial Bladder Cancer. Indian Journal of Pharmaceutical Sciences, 2020: 46-49.DOI: 10.36468/pharmaceutical-sciences.spl.9

[8] "Fukuo kaya W, Kimura T, Miki J (2019). Effectiveness of Intravesical Doxorubicin Immediately Following Resection of Primary Non–muscle-invasive Bladder Cancer: A Propensity Score-matched Analysis. Clinical Genitourinary Cancer. Doi: 10.1016/j.clgc.2019.09.005"

[9] Horváth Z, Reszegi A, Szilák L (2019). Tumor-specific inhibitory action of decorin on different hepatoma cell lines. Cellular signalling, 62: 109354. Doi: 10.1016/j.cellsig.2019.109354

[10] Hourigan S K, Zhu W, Wong W S W (2020). Studying the urine microbiome in superficial bladder cancer: samples obtained by midstream voiding versus cystoscopy. BMC urology, 2020, 20(1): 5.doi:10.1186/s12894-020-0576-z

[11] Jordan B, Meeks J J (2019). T1 bladder cancer: current considerations for diagnosis and management. Nature Reviews Urology, 16(1): 23-34.doi:10.1038/s41585-018-0105-y

[12] Kida T, Kobashi T, Usuda Y (2020). Severe and Prolonged Hypotension After Oral 5-Aminolevulinic Acid Administration in a Patient with End-Stage Renal Disease Undergoing Transurethral Resection of a Bladder Tumor: A Case Report. A&A Practice, 2020, 14(1): 12-14.doi:10.1213/XAA.0000000000001128

[13] Kimura Y, Honda M, Morizane S (2019). Effect of Intravesical Bacilli Calmette-Guerin Therapy After Second Transurethral Resection in Stage Ta T1 High-Grade Bladder Cancer. Yonago Acta Medica, 62(2): 191-197.doi:10.33160/yam.2019.06.003

[14] Lee J, Jeh S U, Koh D H (2019). Probe-Based Confocal Laser Endomicroscopy During Transurethral Resection of Bladder Tumors Improves the Diagnostic Accuracy and Therapeutic Efficacy. Annals of surgical oncology, 26(4): 1158-1165. Doi:10.1245/s10434-019-07200-6

[15] Li C, Gao L, Zhang J (2020). The effect of holmium laser resection versus standard transurethral resection on non-muscle-invasive bladder cancer: A systematic review and meta-analysis. Lasers in Medical Science: 1-10.doi: 10.1007/s10103-020-02972-w

[16] Martini W Z, Holcomb J B, Yu Y M (2020). Hypercoagulation and Hypermetabolism of Fibrinogen in Severely Burned Adults. Journal of Burn Care & Research, 41(1): 23-29. Doi:10.1093/jbcr/irz147

[17] McMullen C K, Rosetti M O K (2019), Weinmann S. Clinical Use Cases for a Tool to Assess Risk in Superficial Bladder Cancer. The Permanente journal, 23. doi: 10.7812/TPP/18.276.

[18] Mullenders J, de Jongh E, Brousali A (2019). Mouse and human urothelial cancer organoids: A tool for bladder cancer r0search. Proceedings of the National Academy of Sciences, 116(10): 4567-4574.doi: 10.1073/pnas.1803595116

[19] Ouzaid I, Panthier F, Hermieu J F (2019). Contemporary surgical and technical aspects of transurethral resection of bladder tumor. Translational andrology and urology, 8(1): 21. Doi:10.21037/tau.2019.01.04

[20] Poletajew S, Krajewski W, Adamowicz J (2019). A systematic review of preventive and therapeutic options for symptoms of cystitis in patients with bladder cancer receiving intravesical bacillus Calmette–Guérin immunotherapy. Anti-cancer drugs, 30(5): 517-522.doi: 10.1097/CAD.0000000000000775.

[21] Raj K K, Taneja Y, Ramdev P (2019). A

prospective observational study to evaluate the role of restaging transurethral resection of bladder tumour in patients with non-muscle invasive bladder cancer. International Journal of Research in Medical Sciences, 7(11): 4134.

[22] Soukup V, Čapoun O, Cohen D (2020). Risk stratification tools and prognostic models in non–muscle-invasive bladder cancer: a critical assessment from the European Association of Urology Non-muscle-invasive Bladder Cancer Guidelines Panel. European urology focus, 6(3): 479-489.doi: 10.1016/j.euf.2018.11.005

[23] Suh J (2019). Transurethral Resection of Bladder Tumor[M]//Management of Urothelial Carcinoma. Springer, Singapore: 45-51. https://doi.org/10.1007/978-981-10-5502-7_7

[24] Taskovska M, Kreft M E, Smrkolj T (2020). Current and innovative approaches in the treatment of non-muscle invasive bladder cancer: the role of transurethral resection of bladder tumor and organoids. Radiology and Oncology, 1(ahead-of-print). doi: 10.2478/raon-2020-0025

[25] Torres L, Klingberg E, Nurkkala M (2019). Hepatocyte growth factor is a potential biomarker for osteoproliferation and osteoporosis in ankylosing spondylitis. Osteoporosis International, 30(2): 441-449. Doi:10.1007/s00198-018-4721-4

[26] Xu S, Yao Q, Liu G (2020). Combining DWI radiomics features with transurethral resection promotes the differentiation between muscle-invasive bladder cancer and non-muscle-invasive bladder cancer. European Radiology,30(3):1804-1812. https://doi.org/10.1007/s00330-019-06484-2

[27] Zhang D, Yao L, Yu S (2020). Safety and efficacy of en bloc transurethral resection versus conventional transurethral resection for primary nonmuscle-invasive bladder cancer: a meta-analysis.World Journal of Surgical Oncology,18(1): 1-12. doi: 10.1186/s12957-019-1776-4