Bipolar en Bloc Resection – Is it the Future in Non-Muscle Invasive Bladder Cancer?

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Rezumat

Rezecția bipolară en bloc – viitorul în tratamentul tumorilor vezicale non-infiltrative?

Cancerul vezicii urinare este printre cele mai frecvente tumori urologice. În acest context, în ciuda tuturor progreselor tehnologice, rezecția transuretrală a vezicii urinare (TURV) continuă să reprezinte modalitatea de diagnostic și tratament standard în tumorile vezicale non-invazive (NMIBT). Tehnica chirurgicală a rezecției tumorale bipolare en bloc ar putea fi realizată folosind electrodul cu buton emisferic cu plasmă în lichid de irigare salină sau se poate folosi fibra laser. Formațiunea malignă este treptat împinsă în sus și separată de peretele vezicii urinare. Aspectul final al peretelui vezicii urinare dezvăluie fibrele musculare curate ale detrusorului, fără țesut malign rezidual. În ceea ce privește rezultatele, parametrii operatori sunt heterogeni în literatura de specialitate, din cauza diferitelor dispozitive de rezecție utilizate. Cu toate acestea, există câteva puncte principale în toate studiile, cu privire la ratele de recurență mai mici, comparativ cu rezecția clasică și, de asemenea, cele referitoare la buna calitate a mostrelor de rezecție. În concluzie, chiar dacă rezultatele generale sunt favorabile pentru rezecția în bloc, există deocamdată puține studii comparative multicentrice mari care să stabilească locul potrivit al metodei în armamentariul urologic.

Cuvinte cheie: rezecție bipolară, en bloc, tumoră vezicală non-invazivă

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Abstract

Bladder cancer is among the most common urological malignancies. In this context, despite of all the technological advancements, transurethral resection of bladder tumour (TURBT) continues to represent the gold-standard diagnostic and treatment in non-muscle invasive bladder tumours (NMIBTs). The surgical technique of en bloc bipolar tumour resection could be performed using the hemispherical shape plasma-button electrode and saline irrigation fluid or using the laser fiber. The malignant formation is gradually pushed up and separated from the bladder wall. The final aspect of the bladder wall reveals the clean muscular fibers of the detrusor layer, free of malignant tissue, irregularities or debris. Concerning the outcomes, the operative parameters are heterogenous in the literature, because of the different resection devices utilized. However, there are few main points where all the studies agreed, concerning the lower recurrence rates comparing with classical resection and also the good quality resection samples. In conclusion, even if the general outcomes are favourable for the en bloc resection, there is still a lack of large multicentric comparative trials which establish the right place of the method in the urological armamentarium.

Key words: bipolar resection, en bloc, non-muscle invasive bladder cancer

Introduction

Bladder cancer among the most common urological malignancies. Similarly, with another neoplastic pathologies, a complete resection is essential to achieve a good prognosis (1).

In this context, despite of all the technological advancements, transurethral resection of bladder tumour (TURBT) continues to represent the gold-standard diagnostic and treatment in non-muscle invasive bladder tumours (NMIBTs) according to the EAU Guidelines. However, a complete resection can be achieved by either fractioned or en-bloc resection (2). En-bloc resection could be performed using monopolar or bipolar current, Thulium-YAG or Holmium-YAG laser being feasible in selected exophytic tumours, with an important advantage because it provides high quality resected specimens with the presence of detrusor muscle in 96-100% of cases (3-5), as is specified in the 2019 EAU Guidelines. Reaching an accurate diagnosis, especially in the pathologic stage (pT), is important to choose appropriate treatment strategies in these patients. Furthermore, an accurate histopathological diagnosis leads to reduction of overall treatment costs, because an unnecessary second

TUR procedure or adjuvant intra-vesical therapy is avoided (6). The damage of resected tissue is quite impossible to be avoided in traditional TUR, the ideal resection method preserving the resection mass, especially in solid tumours. That is why the en bloc resection appeared to be a valid option from 20 years ago because of a very good preserving of pathological specimen (7). The only debatable subject is linked to the tumour dimension suitable for resection. Hurler et al. suggested that patients with a single tumor with diameter < 30 mm and/or those with < 4 lesions are eligible for en-bloc resection (4), while Sureka et al. excluded tumors over 40 mm in diameter (8). Lodde et al suggested that a tumour diameter over 25 mm could represent a contraindication for en-bloc resection (9). The effectiveness of Ho:YAG or Tm:YAG laser treatment was also proved by many studies (10), because of the advantages of en-bloc laser resection which consists in the absence of the obturator reflex, minimal intraoperative bleeding, reduced hospitalization period, and lower complications, as compared to conventional TUR (2,11). However, laser resection is inferior to electrical resection in terms of availability and medical economics.

Last but not least, in univariate or multi-

variate analysis performed to assess the impact of potential prognostic factors on recurrence-free survival, it was observed that neither age nor the number of days between primary and second en bloc resection were independent predictors of recurrence, the only predictor of recurrence being the tumor grade (12,13).

Operatory Technique

The surgical technique of en bloc bipolar tumour resection could be performed using the hemispherical shape plasma-button electrode (*Fig. 1*) and saline irrigation fluid, using the loop (*Fig. 2*) or using the laser fiber. The malignant formation is step by step separated from the bladder wall (*Fig. 3*). It could be performed for achieving that aspect, both the bipolar plasma vaporization and the mechanical detachment using the “button” shape electrode or the loop (*Fig. 4*). It should be mentioned in the end, that only by taking specimens from the tumour bed implantation area using the standard semicircular resection loop, can confirm the accuracy of the malignant tissue ablation process by en bloc resection. Tumour bed plasma button coagulation constitutes the last stage of the procedure (*Fig. 5*). The final aspect of the bladder wall reveals the clean muscular fibers of the detrusor layer, free of malignant tissue, irregularities or debris (*Fig. 6*) (14).

To perform en-bloc resection of large, malignant bladder tumors, various modified methods and new devices could be used. Naselli et al. retrieved tumors with diameters ≤ 45 mm using Collins loop and laparoscopic forceps (15). Meanwhile, Frische et al. performed en-bloc resection of tumors under 75 mm in diameter, using a water jet dissector and needle knife for transurethral dissection (16). A study evaluated the combined use of electrical en-bloc resection of the tumor (E-EBRT) and TUR to treat patients with NMIBC. Although E-EBRT was performed for single tumor masses ≤ 3 cm and for those BCs with ≤ 4 lesions, the en-bloc resection was limited to tumors with ≤ 3 lesions, and those with diameters ≥ 4 cm was

Figure 1. En- bloc plasma button vaporization – bladder tumour eligible for this procedure

removed via TUR (17).

Figure 2. En bloc resection - bladder tumour

Figure 3. En bloc resection - pushing up the bladder wall

Figure 4. En bloc detachment with the loop in NBI mode

Figure 5. En bloc detachment – free muscular layers – bipolar loop

General outcomes

According to some studies, en bloc resection had the main advantage of a shorter operation time (22 minutes (18) versus 46 minutes (19)), in conventional TURBT, because the principle of the method consists in the resection of the tumor base and subsequently, in detaching the lesion in one piece. Also, in another study, Hayashida et al. showed an operatory time of 16.9 min for en bloc resection versus 17.3 TURBT for tumors of up to three cm (6) for the resection of one tumor. D'souza reported for en bloc resection performed with Ho laser, for an average number of tumors of 2.5, an operatory time of 58.2 min (10), while for Green light enucleation, for an average number of 1.76 tumors, the operatory time was of 21.46 min (20) and for Thulium-YAG, that was significantly higher, of 56.5 min, for an average tumor number of 1.8 (21). A new study about

Figure 6. Plasma coagulation of the tumour bed

en bloc bipolar resection with plasma button showed similar outcomes concerning the operatory time of average 35 min (12) (Table 1).

When compared to the classical TURBT, the bipolar en bloc resection patients benefited from significantly reduced catheterization

Table 1. The operatory time using different devices for en bloc resection in NMIBC

Study	Device used	Operatory time (en bloc resection)	Average number of tumors
Zhong C. et al	HoLBRT	22 min	NA
Hayashida Y. et al.	TURBT	16.9 min	1
D'Souza N. et al.	Ho-Laser	58.2 min	2.5
Chen J. et al.	Green light Laser	21.46 min	1.76
Chen X. et al.	Thulium-YAG	56.5 min	1.8222
Zhang J. et al.	Bi-TURBT	35 min	1.43

period (1.4 days (11) or 2 days in another study (12) versus 4.2 days (19)) and hospital stay (1.5 days (22) or 3 days in another study (12) versus 4.27 days (23)). All in all, there are other studies that showed a similar period of catheterization in the case of en bloc resection, of 4.2 days in comparison with TURBT where the period was 3.7 days, without a statistical significance difference between the groups (6). Also, the complication rate was similar in the en bloc resection group versus TURBT according to Clavien-Dindo classification (6). However, the most common complications for TURBT remains bleeding and obturator nerve reflex, while for en-bloc TURBT, no uncontrollable bleeding, perforation, or other severe complications were observed (12). Hurle et al., realized in a multicentre observational study that both, en-bloc primary and re-resection procedures were feasible, safe, associated with low complication rates (4).

Concerning the pathologically confirmed tumor stage, the range of literature data presents a relatively wide variation for pTa (37.5–54% (9)), as well as for pT1 (46–62.5% (24)) NMIBT stage.

Even more, during the long-term follow-up (30–40 months), en bloc resection had a lower recurrence rate by comparison to the standard procedure (28.6% versus 62.5%) (8). The recurrence rate at the first follow-up cystoscopy (RRFF-C at 3 months) was 3.85% (three patients) (25). A very recent multicentre study realized by Hurle et al. on 78 patients with NMIBC to which was performed an en bloc re-resection after the initial en bloc resection revealed only five residual cancers: one patient with pTaG3 (1.28%), and four having pTis (5.13%) (25). There are also many studies either with bipolar or laser en bloc resection that mentioned presence of the detrusor muscle in all the samples, without being infiltrated by tumor cells, that representing a significant advantage of the method (12, 25).

Conclusions

Nowadays en bloc resection could be realized in many ways: monopolar, bipolar or using

different models of lasers. The outcomes are similar with classical resection methods, but there is still a lack of large multicentric comparative trials which establish the right place of the method in the urological armamentarium.

Conflict of Interest

The authors have no disclosures.

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