SAS Journal of Surgery
Abbreviated Key Title: SAS J Surg
ISSN 2454-5104
Journal homepage: https://www.saspublishers.com

OPEN ACCESS

Urology

Modified Hautmann Enterocystoplasty after Total Cystectomy for Bladder Tumor: Evolution Curve and Morbi-Mortality

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DOI: 10.36347/sasjs.2023.v09i04.008 | **Received:** 08.03.2023 | **Accepted:** 15.04.2023 | **Published:** 18.04.2023

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Abstract **Original Research Article**

***Introduction*:** Bladder cancer is the 2nd most common urological cancer after prostate cancer. Radical cystectomy (RC) with lymph node dissection and urinary diversion (UD) is considered the standard treatment for invasive localized bladder cancer. There are many variations of bladder replacement, the most common of which is the Hautmann bladder. ***Patients and Methods*:** The global objective of our study is to report the results of a retrospective analysis concerning 46 patients who benefited from a modified Hautmann type bladder replacement post cystectomy over a period of 8 years, from January 2014 to December 2021. This evaluation focuses on the evolution of Hautmann type enterocystoplasties as well as the factors favoring. ***Results*:** The evolution of the number of patients who received Hautmann bladder replacement has varied over the years with a peak in 2016 estimated at (26%), followed by the year 2015 (21%). The average age of the patients was 54 years. The preoperative general condition of the patients was evaluated using the ASA score. ASA 1 was predominant in the age group 50-59 years (100%). Short-term postoperative mortality: 1 death (2%) was objectified. 22 patients presented short-term complications, corresponding to a morbidity rate calculated at 47%. 2 deaths (4%) occurred late. Late morbidities were looked for and diagnosed during the follow-up consultations, with a rate of (17%). ***Discussion*:** The comparative study of the evolution curve of the number of patients who received a Hautmann type bladder replacement and those who received a non-continuous Bricker type urinary diversion showed variations with a peak in 2016 for the Hautmann type bladder replacement (26%) and a peak in 2021 for the Bricker type diversion (25.03%).

Keywords: Bladder cancer, entérocystoplasties, evolution curve, complications.

INTRODUCTION

Bladder tumors currently represent 3.3% of all cancers [1]. It is the second most common urogenital cancer in men after prostate cancer [2]. Radical cystectomy (RC) with lymph node dissection and urinary diversion (UD) is considered the standard treatment for invasive localized bladder cancer. There are many variations of bladder replacement, the most common of which is the Hautmann bladder. This is a new technique of low-pressure detubulated continental orthotopic internal shunting, using an ileal neo reservoir arranged in W or M [3, 4].

PATIENTS AND METHODS

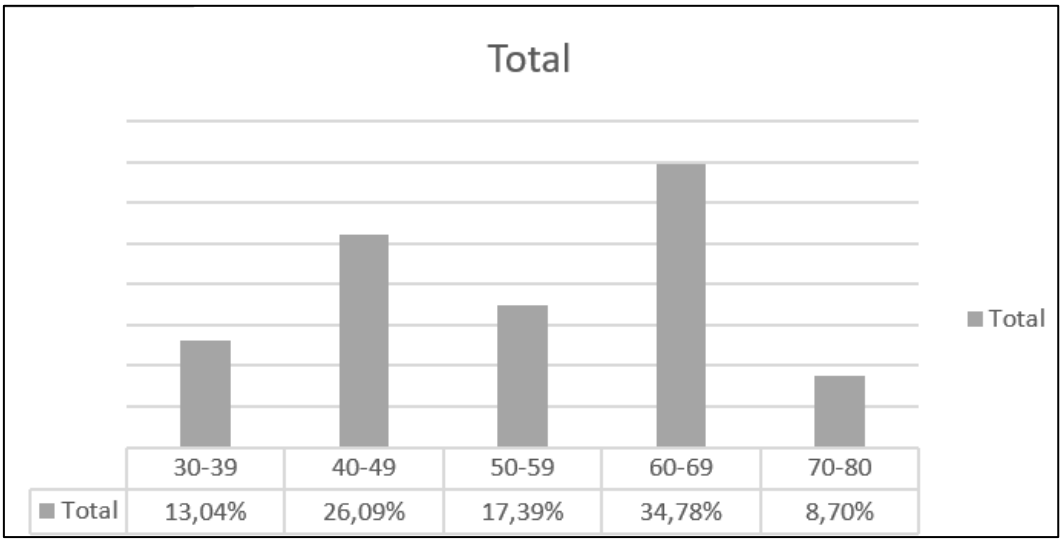
The general objective of our study is to report the results of a retrospective non-randomized analysis of 46 patients who benefited from a modified Hautmann type bladder replacement in post-cystectomy at the Urology Department of ARRAZI Hospital in Marrakech over a period of 8 years, from January 2014 to December 2021. This evaluation focuses on the evolution of Hautmann type enterocystoplasties and the factors favoring them. These data are obtained from patient registers, medical records during hospitalization, oral interviews during follow-up consultations, operative report registers and anatomopathological results. Our data are entered using Microsoft Office Excel software.

RESULT

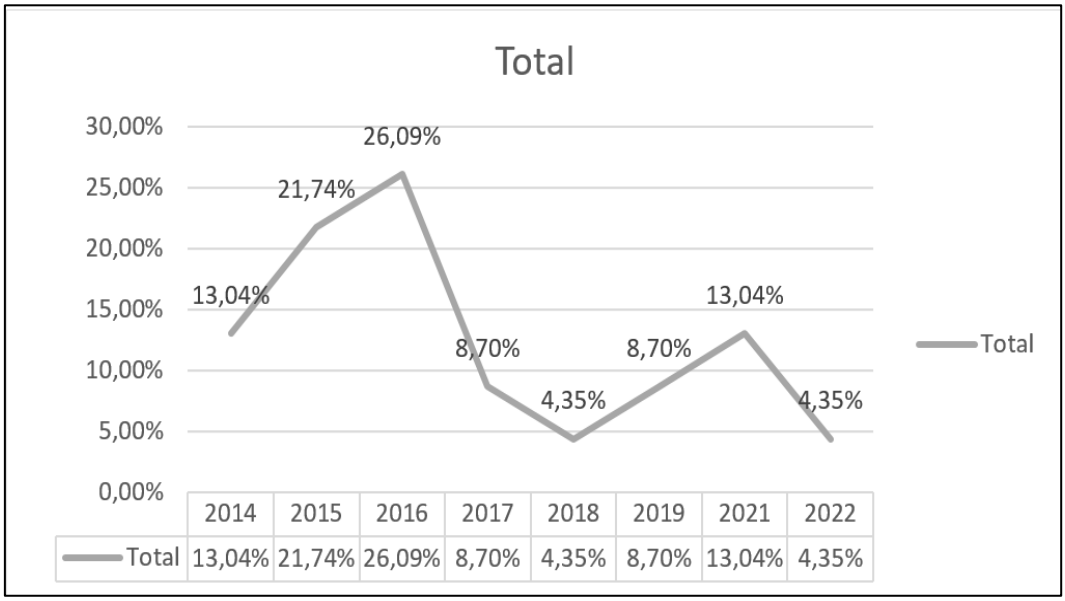
These were 46 patients who benefited from Hautmann cystectomy and enterocystoplasty for bladder tumors, the mean age of the patients in our series was 54 years, with age extremes ranging from 31 to 72 years. The predominant age group between 60 and 69 years with a number of 16 patients with a percentage

of 34% followed by the age group 40-49 years with a percentage of 26% with a predominance of the male sex Graph 1.

The evolution of the number of patients who received a modified Hautmann type bladder replacement post cystectomy in the Department of Urology has seen variations over the years with a peak in 2016 estimated at (26%) followed by the year 2015 (21%) and a nadir in the year 2018 (4.3%) followed by the year 2019 (8%).



Graph 1: Distribution of patients by age

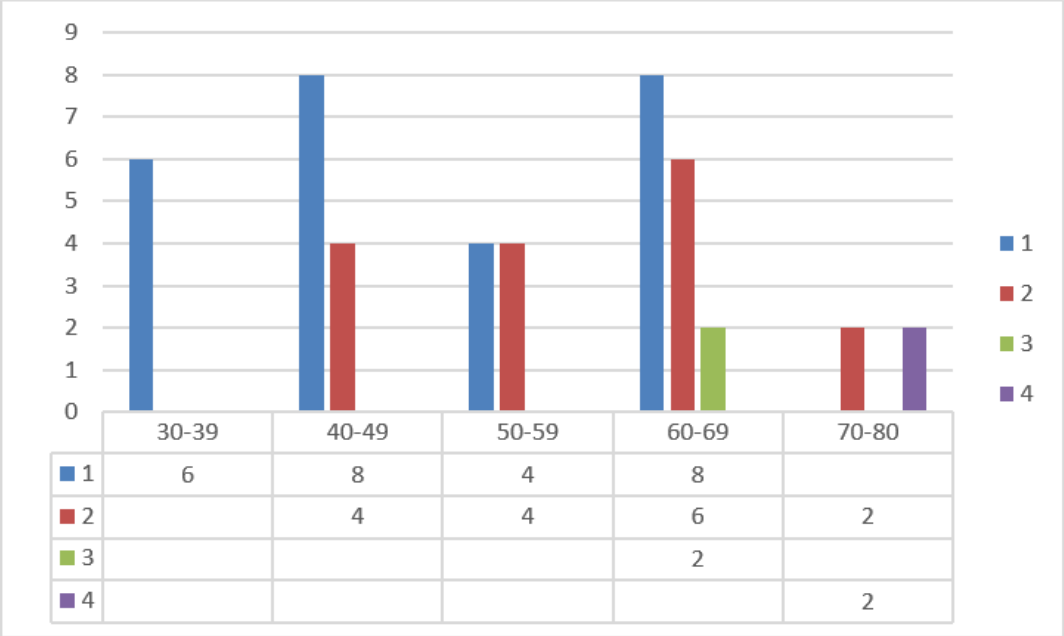


Graph 2: evolution curve of patients who received cystectomy and enterocystoplasty during the period 2014 - early 2022

36 of our patients (78%) were smokers, with an average of 20 packs/year, 18 patients (60%) had stopped smoking at the time of the cystectomy and 10 others (21%) were alcohol users. Of the 46 patients included in the study, 30 patients (65%) had no significant medical history. 16 patients (37.1%) had a medical history, diabetes and hypertension were the 2 most represented diseases.

The preoperative general condition of the patients was evaluated using the ASA score. ASA 1 was predominant in the 40-49 and 50-59 age groups with 66% in the 40-49 age group and 100% in the 50-59 age group.

ASA 2 was predominant in the 40-49 (33%) and 50-59 age groups (50%). For ASA 3, there was a predominance in the 60-69 age group (25%). As for the ASA 4, we note a predominance in the age group from 70 to 79 years with a percentage of 50%.



	30-39	40-49	50-59	60-69	70-80
1	6	8	4	8	
2		4	4	6	2
3				2	
4					2

Graph 3: ASA score by age group

In our series 12 patients (26%) were diabetic, and 10 patients (23%) had hypertension. The majority of our patients (34 or 74%) had a history of multiple resections with different anatomopathological stages ranging from pTa to pT2, there was a remarkable predominance of two stages pT1 and pT2.

Macroscopic hematuria was the reason for emergency consultation in all our patients, associated with signs of lower urinary tract type emptying in 43% complicated by AUR in 40%. In the pelvic examination 36 patients (78% in our series) presented a mobilizable bladder base against 10 patients (23%) with a non mobilizable bladder base. Concerning the prostate, 22 patients (47%) had an hypertrophied prostate.

The average preoperative hemoglobin was 9 g/dl, with a minimum of 7 g/dl and a maximum of 13 g/dl and the average hematocrit was 31%. 42 patients presented anemia with a hemoglobin level lower than 13 g/dl which constitutes 91% of our patients. The average blood urea level measured preoperatively was 0.37 g/l, with values ranging from 0.11 g/l to 1.23 g/l. The mean preoperative plasma creatinine was 9.90 mg/l, with a minimum of 4.1 mg/l and a maximum of 24 mg/l. 5 patients were admitted with renal failure and also presented moderate bilateral dilatation of the pyelocalic cavities on ultrasound with preserved renal parenchyma. However, 10 other patients presented a moderate to major dilatation of the pyelocalic cavities without alteration of the renal function.

Urine drainage by percutaneous nephrostomy provided renal relief in all ten cases, with an improvement in renal function in those cases that had altered initial renal function.

On renal and vesico-prostatic ultrasound, the bladder tumor was described as parietal thickening in 12 patients (26%) and as intravesical mass in 34 patients (74%). The preoperative upper urinary tract was normal and without abnormality in 26 patients (56%), however dilatation of the bilateral pyelocalic cavities was visualized in 10 patients (22%), on the right side dilatation of the pyelocalic cavities was found in 8 patients (18%), only one patient presented a dilatation of the left pyelocalic cavities (4%).

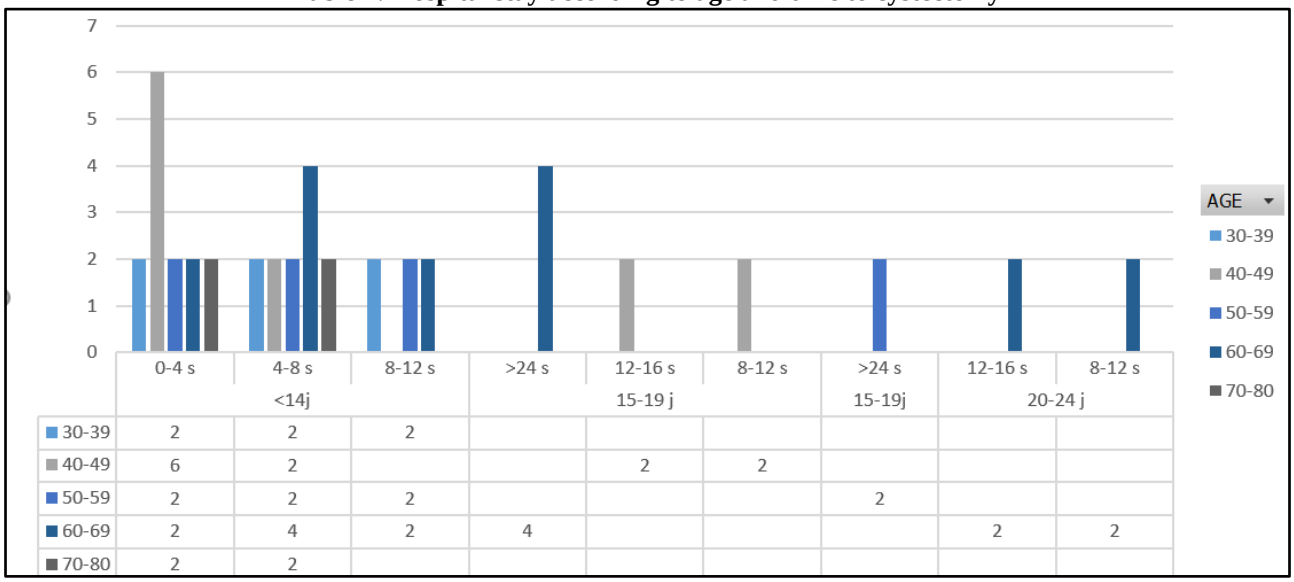
Cystoscopy was performed in all our patients. It allowed to visualize the tumor, to specify its macroscopic aspect and its location, its base of implantation and the infiltration of the ureteral meats. The tumor location was scattered over the whole bladder with 21% in the right lateral wall, 13% in the left lateral wall, 13% in the posterior wall and 4% in the anterior wall

The remaining patients had multiple localization (papillomatosis) in 14 patients 30%, with circumferential thickening in 4 patients (8%) Deep biopsy resections involving the bladder muscle were performed in all patients.

Urothelial carcinoma is the most common histological type found in our series, in all our patients. The tumor stage, according to the TNM classification, the most frequent in our series was pT1 with 48% followed by pT2 with 43% with 9% for pTa stage in last place. The tumor grade in our series is divided into high grade and low grade according to the 2004 classification. It was found that high grade is the most responsive grade with 91% against 9% for low grade.

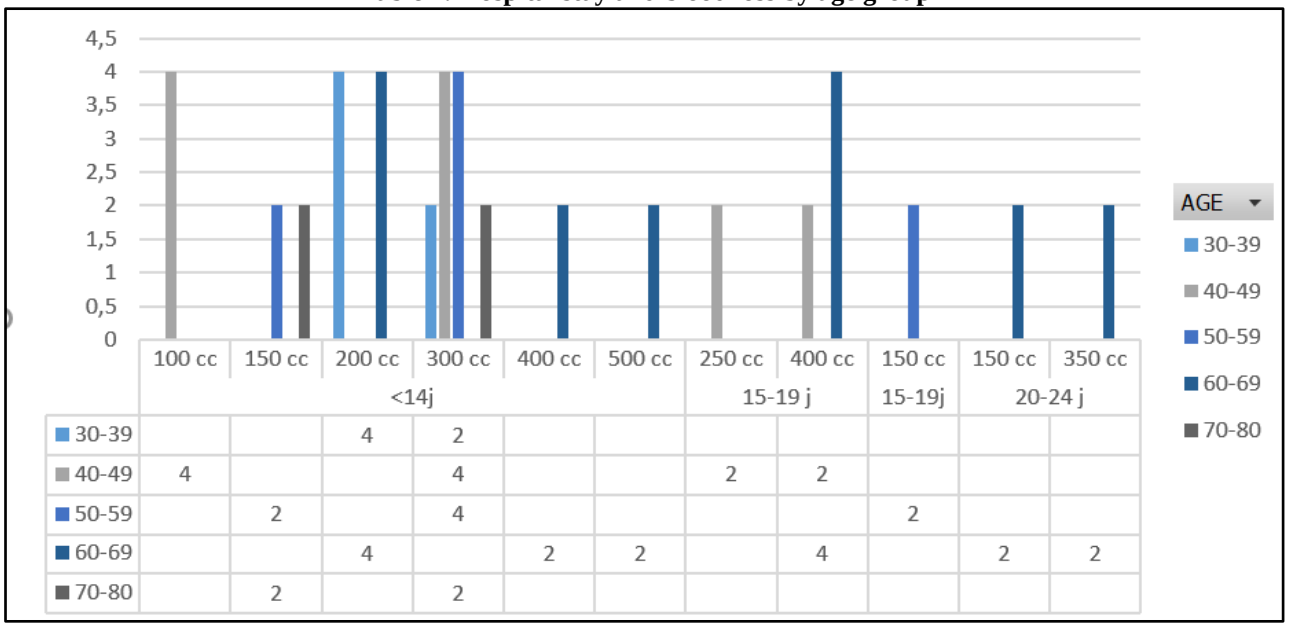
The time between the last resection and cystectomy was 6 weeks with extremes ranging from 4 to 24 weeks. When the time between the last resection and the cystectomy is short with a low age range, the average length of hospital stay is shortened.

Table 1: Hospital stay according to age and time to cystectomy



	0-4 s	4-8 s	8-12 s	>24 s	12-16 s	8-12 s	>24 s	12-16 s	8-12 s
	<14j			15-19 j			15-19j	20-24 j	
30-39	2	2	2						
40-49	6	2			2	2			
50-59	2	2	2				2		
60-69	2	4	2	4				2	2
70-80	2	2							

Table 2: Hospital stay and blood loss by age group



	100 cc	150 cc	200 cc	300 cc	400 cc	500 cc	250 cc	400 cc	150 cc	150 cc	350 cc
	<14j						15-19 j		15-19j	20-24 j	
30-39			4	2							
40-49	4			4			2	2			
50-59		2		4					2		
60-69			4		2	2		4		2	2
70-80		2		2							

Peroperative blood loss was 243 cc on average with a maximum of 500 cc. Intraoperative transfusion was justified in 24 patients (52%) with an average of 2 packed red blood cells. We note a low rate of blood loss and a short hospital stay in the lower age groups. The hospital stay was <14 days in 32 patients (69%) Table 2.

The operative time in our series was an average of 282 min with a maximum of 420 min, and a minimum of 180 min.

Short-term postoperative mortality: Only one death (2%) was observed in our series, due to a pulmonary embolism. Short-term postoperative morbidity: 22 patients in our series presented short-term complications, representing a morbidity rate calculated at 47%. 12 patients (26%) presented complications not specific to bladder replacement (functional renal insufficiency (4%), parietal infections (13%), lymphorrhagia was observed in 6 patients (13%), 2 patients (4%) we observed abdominal distension combined with a delay in gas emission While 10 patients (21.7%) had complications specific to bladder replacement: 6 patients (13%) presented a

neovesicocutaneous fistula diagnosed following the appearance of urinary leakage at the surgical wound, obstruction of the urethral lumen by the enclosure of the mucous plug was responsible for acute urinary retention in (17%) of the patients, 2 patients presented an intestinal fistula evidenced by the exit of digestive fluid at the parietal wound (4%).

Late postoperative mortality and morbidity: 2 deaths (4%) occurred late. The first death occurred after 14 months, in a retroperitoneal and pulmonary metastasis. A second death occurred after 18 months. It occurred in a context of severe malnutrition and marked weight loss. Late morbidities were sought and diagnosed during follow-up visits. 6 patients (13%) had deep parietal abscesses, 2 patients (4%) developed chronic renal failure without the need for hemodialysis. No uretero-neo-vesical or neo-vesico-ureteral stenosis was found. No neovesico-ureteral reflux was found. No spontaneous perforation of the neovessel was found.

DISCUSSION

Bladder cancer is the fourth most common cancer in terms of incidence and the seventh most common cause of death for all cancers combined, and is the second most common urological cancer after prostate cancer. Their incidence is increasing by about 1% per year [5]. On a national scale, the data available to us were recorded on the Cancer Registry of Greater Casablanca: Bladder cancer represented 3.1% of cases recorded over the period 2008 - 2012. The patients with this type of cancer, 85.3% were male and 14.7% were female. During the five years studied, 752 cases of bladder cancer were registered, representing a crude incidence of 3.7 per 100,000 inhabitants (for women, it is 1.1 per 100,000 women and for men it is 6.5 per 100,000 men). Standardization on the world population yielded a rate of 4.7 per 100,000 population (1.3 per 100,000 for women vs. 8.6 per 100,000 for men) [6].

The risk of developing bladder cancer increases with age. Bladder cancer usually occurs in men between the ages of 50 and 70. Several factors have been incriminated in the genesis of bladder cancer, with varying degrees of certainty [7]. Smoking is the most important risk factor for bladder cancer. Smoking is a rich source of carcinogenic compound. The urothelial cells are damaged mainly by harmful substances [8, 9].

Occupational exposure may account for up to 20% of exposure in all cases of bladder cancer in industrialized countries. The bladder is the major internal organ affected by occupational carcinogens. Exposure to aromatic amines, in particular benzidine, polycyclic aromatic hydrocarbons and diesel exhaust is a definite risk factor for bladder cancer [8]. Congenital anomalies of the bladder, chronic bladder irritation, post-infectious or post-traumatic, abuse of analgesics, chemotherapy (Cyclophosphamide or ifosfamide in high doses) and radiotherapy are also definite risk factors [10, 11].

Bladder tumors are classified according to their histological type, grade and TNM stage. 98% of bladder tumors are epithelial in nature, non-epithelial tumors are very rare. Non-epithelial tumors are very rare and represent only 2% of all bladder tumors [12].

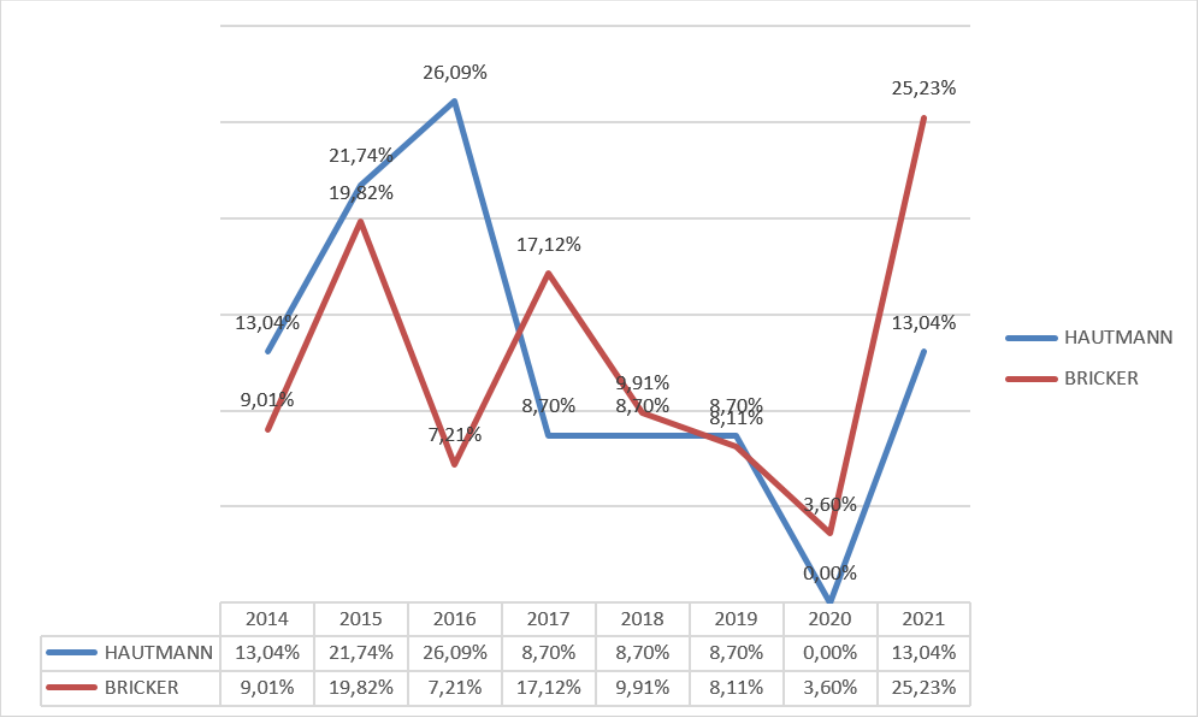
Bladder cancer is revealed in nearly 80% of cases by macroscopic hematuria, which is classically described as terminal, as well as symptoms of bladder irritation such as pollakiuria, urinary burning and urinary urgency. Recurrent urinary tract infections may also suggest the diagnosis, especially in elderly patients. The clinical examination includes suprapubic palpation as well and pelvic touching to look for a mass in case of advanced pathology with, in extreme cases, a pelvic shielding aspect if the tumor has already invaded the neighboring organs.

The surgical treatment of muscle-infiltrating bladder tumors by total cystectomy, first described by Bernhard Bardenheuer in 1887, involves the diversion of urine from the ureters, initially done by the direct connection of the ureters to the skin. Urinary diversions through a segment of isolated intestine were developed by J. Verhoogen (1908), L. Seiffert (1935) and E.M. Bricker (1950) [13].

These skin shunts are simple and effective, but they profoundly alter the patients' body schema. Respecting the body schema by replacing the bladder to allow patients to urinate by their natural route was a surgical challenge. Indeed, on October 3, 1950, at the Saint-Louis Hospital, Roger Couvelaire put into effect his idea of replacing the bladder by a segment of ileum.

Maurice Camey Faced with the problem of locally advanced bladder cancer, this surgeon improved the technique of bladder replacement, Maurice Camey, it was shown that this neovessis preserved the synchronous peristalsis of the intestine and could lead to pressure increases in the graft leading to urinary leakage through the urethra or reflux in the ureters. The Hautmann bladder uses 70 cm of terminal ileum, according to the same principles; an incision on the anti-mesenteric edge makes it possible to make a pocket but this time in the shape of an M [14].

The following graph demonstrates a net decrease in the rate of enterocystoplasties performed in our urology department between the year 2014 and the year 2021.



	2014	2015	2016	2017	2018	2019	2020	2021
HAUTMANN	13,04%	21,74%	26,09%	8,70%	8,70%	8,70%	0,00%	13,04%
BRICKER	9,01%	19,82%	7,21%	17,12%	9,91%	8,11%	3,60%	25,23%

Graph 4: Distribution of the number of Hautmann type enterocystoplasties vs. Bricker type bypass according to the years in our series

Bladder cancer is characterized by a net male predominance; the predominant sex in the series studied of enterocystoplasty is male [15]. The operative time reported includes both the time required for cystectomy with lymph node curage and the time required to make the ileal reservoir. This time varies according to the series. According to the results of the series by Soulié *et al.,* [16], the average time for cystectomy and bladder replacement was 280 min. In the series by E. Mateo *et al.,* [17] the average time was 323 min. The operative time in our series was an average of 282 min with a maximum of 420 min, and a minimum of 180 min. There is a considerable difference between the different series. This is probably related to the use of procedures that can shorten the operative time. The tissue thermo-fusion system adopted by our team actively participates in the reduction of the operative time by facilitating the control of the bladder fins and by simplifying the intestinal resection. This would allow a reduction of the operative time [18].

Peroperative mortality has increased considerably. Most of the current series have a zero operative mortality rate, reflecting the improvement of surgical techniques and the progress of anesthesia.

In the series by HASSAN ABOL-ENEIN [19] *et al.,* no patient died during the operation. In our series, we also had no deaths during the operation, which is in line with the results of the literature.

The average blood loss described in the literature is between 400 and 2000cc. The average blood loss caused by cystectomy-replacement in the series by Joniau [20] *et al.,* was 1000ml. In our series, peroperative blood loss was 243 cc on average with a maximum of 500 cc. In the series studied, no peroperative incidents were described, whereas in our series.

The average blood loss described in the literature is between 400 and 2000cc. The average blood loss caused by cystectomy-replacement in the series by Joniau [20] *et al.,* was 1000ml. In our series, peroperative blood loss was 243 cc on average with a maximum of 500 cc. In the series studied, no peroperative incidents were described, whereas in our series. Of different causes, 9 deaths were closely related to tumor dissemination. Heart failure was the cause of the other two deaths. Our results on medium-term mortality do not match the results of the literature to a large extent. This may be explained by the fact that the average postoperative follow-up time is not similar in all series and that the selection of patients does not follow the same rules.

Postoperative morbidity is difficult to compare from one series to another; this morbidity is influenced by age > 45 years, tumor stage, preoperative defects, ASA score, nutritional status, type of graft and preoperative urinary tract infection [22]. Soulié *et al.,* [21] report a percentage of late complications in the order of 34.4%. The percentage of non-specific late complications was 25.4% and the percentage of specific ones was 9%. Four chronic renal failures were reported. Three patients required reoperation for occlusive

syndrome (5.4%). Medium-term complications in our series: Three patients (13%) had deep parietal abscesses, one patient (4%) developed chronic renal failure without need for hemodialysis. No uretero-neo-vesical or neo-vesico-ureteral stenosis was found. No neovesico-ureteral reflux was found.

CONCLUSION

Enterocystoplasty is currently considered as the diversion of choice after total cystectomy. The objective of this technique is to maintain a fair and satisfactory balance between the morbidities generated and the functional results obtained in the short and long term. The results obtained in terms of continence and quality of life is very satisfactory.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

Authors' Contributions

All authors contributed to the conduct of this work. All authors also declare that they have read and approved the final version of the manuscript.

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