1. Introduction

The catastrophe theory suggests that sudden and major shifts occur in behaviour from small changes in circumstances. Although the theory has not been applied to BPH yet, it helps explaining the sudden change which occurred in its management when open prostatectomy was first proposed by Eugene.
Fuller and Peter Freyer in 1895 and 1900 [1,2]. At that time, benign prostatic obstruction was a major cause of suffering for elderly men and death from chronic renal failure and BPH complications was not infrequent. The operation popularised by Freyer was not minor surgery, particularly when taking into consideration the anaesthesia standards existing at that time and mortality rate was not negligible; nevertheless the introduction of BPH surgery was a real revolution. A second, slow and equally important change was brought about in 1932 when Maximilian Stern and Joseph McCarthy put together the Stern-McCarthy instrument, the progenitor of the modern resectoscope, which allowed tissue resection using a wire loop under direct vision [3]. The new technique slowly progressed and finally imposed as the gold standard surgical treatment of BPH. The prostate volume threshold between transurethral surgery and open prostatectomy remains an open issue, patients with glands of 80 to 100 ml may be considered for open surgery in some countries while a two stage procedure with transurethral resection of one prostatic lobe at a time may be performed in other countries [4].

Before medical treatment of BPH became first line treatment, surgery of BPH in western world, particularly in US, was mainly about resection of small prostate glands (average weight of resected tissue: 21.1 gr) as patients were operated in the early stage of the disease [5]. A large amount of procedures were performed each year but the number gradually lowered when alpha adrenoceptor antagonists and 5-alpha reductase inhibitors were introduced [6]. Surgery was gradually applied at an increasing later stage of the disease. Although the average prostate volume of surgical series performed in western countries may be small, the situation in other countries may differ significantly. In the far east, for example, the majority of patients may be referred late in the course of the disease when acute and chronic retention develop [7].

Results of the MTOPS study suggest that the use of alpha blockers improves lower urinary tract symptoms and flow rate but neither modifies prostate growth, nor reduce the risk of acute retention and surgery [8]. The high prevalence of medical treatment over the last two decades, might finally result in larger prostate volumes in patients who ultimately progress during alpha adrenoceptor antagonists treatment and require surgery [9]. A recent analysis of Spanish series suggests an increase in the prevalence of open prostatectomy and a parallel increase in the volume of the enucleated adenomas. In the Authors’ series, the rate of open prostatectomy raised from 18.8% in 1992 to 28.6% in 2002 and the mean adenoma weight of increased from 73 to 79 grams. [9]. Whether or not a more widespread use of 5-alpha reductase inhibitors may reverse such situation, is unclear. Management of large prostate glands is not without consequences as Mebust and co-workers clearly identified an association between prostate volume and the risk of complications in patients undergoing TURP [10]. Morbility and costs associated with transurethral resection of large prostates fostered the development of different alternative and minimally invasive treatments (TUMT, TUNA, thick loops, vaportrode, etc), unfortunately they worked best in small to medium size prostate and basically failed to provide a better alternative for large prostate glands. Only HoLEP, the holmium enucleation of the prostate, introduced by Fraundorfer and Gilling in 1998 combined the low invasiveness of transurethral surgery with a debulking capacity comparable to open prostatectomy [11]. The technique offers outstanding clinical outcome with short hospital stay but failed to gain widespread acceptance as the procedure remains challenging and ablation of the enucleated tissue with the morcellator, cumbersome [12]. Surgical treatment of BPH is now undergoing a new little revolution with the introduction of the high power potassium-titanyl-phosphate (KTP) laser which offers a bloodless endoscopic procedure that can be performed as a day case [13]. Whether or not the GreenLight laser is going to prevail over holmium enucleation is not the subject for this review but the forecast for 2006 is that 50% of transurethral procedures for BPH will shift from TURP to KTP laser in USA (data on file LaserScope, Mountain View, CA, USA).

Having set the stage for surgical treatment of BPH, we will now review the evidence on open prostatectomy and we will try to put in the social, economic and medical perspective of the 3rd millennium. The rate of open procedures varies among different countries and cultures, because of different National Health Systems (NHSs), variable economic pressure and available resources. The question is not about the outcome of open prostatectomy but rather about the way it fits into each national NHS and postgraduate training programmes in urology. The growing limitation of financial resources and the inevitable trend for a more efficient use of it pose a great problem in the training of our postgraduates students. If open prostatectomy will not remain in the core curriculum of urological training, the technique is going to die when our generation will retire. Clinical outcome is not the only determinant of success and failure of surgical techniques, and we have experienced how
many of the new treatments “worked miracle just for a while”. Sometimes we tend to be nostalgic with those techniques which help identifying our specialty such as open prostatectomy but we can not afford to be so as failure to evolve frequently led to extinction.

To prepare this manuscript we performed a thorough review of the peer-review literature. The PubMed database was searched for open prostatectomy and prostate surgery as text word, 322 papers were selected, 256 were obtained as full text and read as well as relevant book chapters. Original papers describing the various surgical techniques and points of technique were selected. In the lack (paucity) of randomised studies, case series were selected for data on clinical outcome. Data on complication rates were obtained only from manuscript in which data on early and/or postoperative complications were reported either in a dedicated paragraph or in tables. Eighty references were finally used as a source of evidence for this manuscript. We believe we provide a balance view on the subject of open prostatectomy. We know that the ultimate decision to continue performing open prostatectomy will remain to the individual surgeon although this may not hold true for our successors.

2. Surgical technique

Well before the concept of the zone anatomy was proposed by McNeal [14], macroscopic evaluation of the hyperplastic gland showed a bilobar/trilobar adenoma surrounded by a peripheral gland. A surgical plane could be developed bluntly and the hyperplastic tissue enucleated from the outer prostate. Anatomic landmarks being the bladder neck corresponding to the uppermost part of the adenoma, although this sometimes protrudes into the bladder lumen, and the colliculus seminalis, also know as the veru montanum, at the lower most part of the benign tumour. Enucleation of the adenomatous tissue between these two landmarks, guarantees integrity of the ureteric orifices lying above the bladder neck and the striated sphincter positioned caudally to the colliculus. Prostatectomy is not a bloodless procedure as the blood supply originating from the neurovascular bundles enter the prostate at 5 and 7 o’clock position, additional arteries supply the organ from the bladder neck and from 10 and 2 o’clock position. The blunt interruption of these blood vessels may results in severe bleeding which was once controlled by packing the new prostate cavity with gauzes and more recently by selective use of the electrocautery or by inflating a catheter balloon. An interesting discussion originated, in the 1940s about the surgical approach to the hyperplastic tissues. The transvesical incision proposed by Freyer and supported by Hritschack and other colleagues was fiercely opposed by Millin who proposed to avoid entering the bladder space to access the prostate by approaching the adenoma directly through the peripheral prostate [1,4,15,16]. A number of surgical techniques consisting in various modifications of these two approaches have been proposed over the years trying to minimise intra and post-operative bleeding which sometime lead to blood transfusion [17–27]. Recently laparoscopic adenomectomy was shown to be feasible with satisfactory clinical outcome; we do not know yet whether this is a technical exercise or a viable surgical option [28–30].

2.1. Transvesical prostatectomy

The first complete suprapubic removal of a prostatic adenoma by blind digital enucleation was performed by Eugene Fuller in 1884, the technique carried an high mortality rate (18%) and was opposed by most surgeons [2]. The procedure was then adopted by Peter Freyer, an Irishman born near Clifden who studied medicine at Queen’s College in Galway. After taking his degree in 1874, Freyer joined the Indian Medical Service. In 1896 he returned to England and became part of the surgical staff at St. Peter’s Hospital in London where in 1900 he performed his first prostatectomy [1]. Despite a 5% mortality rate, the operation was a great success. The procedure was rapidly popularised and a second series of one thousand patients was published in 1912; the operation remained the gold standard for fifty years [31].

The surgical procedure of transvesical prostatectomy as it is now performed in most urological centres can be referred to the original one described by Hryntschack and published in 1951 [15]. The patient is placed supine, the legs slightly opened and lowered to provide better exposure to the retropubic space; some degree of Trendelenburg is used to balance patient position. A catheter can be passed to empty the bladder and calibrate urethra. A short midline incision is made between the umbilicus and the pubis, the rectus and pyramidalis muscles are separated and the prevesical space is exposed. Properitoneal vasectomy, not advised routinely, may be done to prevent epididymitis. The bladder dome is freed from the peritoneum and can be brought up to the level of the skin between two Allis forceps. A 3–4 cm longitudinal cystotomy is made between the Allis forceps, suction is used to empty

...
bladder from urine. Two stay sutures are used to suspend the bladder wall on both sides of the cystotomy. The bladder cavity is explored and ureteric orifices identified. A bladder retractor (Deaver retractor or Bracci retractor) is positioned to maintain the bladder open so that the trigone with ureteric orifices were seen throughout surgery. Electrocautery is currently used to incise the mucosa of the bladder neck around the urethral meatus and then through the trigone is a “tennis raquet” shape. The proper plane between the adenoma and the prostate capsule is developed and the adenoma is gently dissected from the capsule with scissors. The dissection is completed using the index finger until only the distal urethra attachment remains, this is finally cut using a pair of curved scissors and the adenoma freed. Alternatively, the surgical plane can be bluntly identified by inserting a finger into prostatic urethra and fracturing the thin anterior adenoma under the symphysis pubis. Once the plane is identified anteriorly, it is then extended laterally and finally posteriorly; distal urethra can also be divided bluntly [32]. After the adenoma is enucleated, the prostatic fossa is inspected for residual tissue that should be removed. Interrupted, absorbable sutures are used to reconstruct the trigone and approximate the bladder neck to the peripheral prostate to ensure haemostasis; alternatively, two semi-continuous sutures can be used. In 1965, Malament proposed the use of an heavy (0,1) nylon or polypropilene suture placed as purse string around the bladder neck, brought through the skin and tied firmly [19]. This technique closes the bladder neck and tamponades the prostatic fossa. The suture should be removed by cutting it at the skin on post-operative day 2 or 3. The proper plane between the adenoma and the prostate capsule is developed by Terrence Millin, an Irishman. Following an outstanding undergraduate curriculum in Ireland, he then moved to England where he became Member of the Royal College of Surgeons. An avid proponent of the transurethral diathermy loop developed by McCarthy in New York, on December 1, 1946 he published a landmark paper in The Lancet, entitled “Retropubic Prostatectomy: A New Extravesical Technique” [16]. The new procedure was immediately considered an outstanding advancement in surgery and Millin’s operation contributed greatly to reducing mortality of open prostatectomy. Millin’s prostatectomy was rapidly exported in USA where it was first presented at the AUA meeting in Buffalo in 1947 and two years later it was first performed live in USA by Millin.

The technique of retropubic prostatectomy was devised by Terrence Millin, an Irishman. Following an outstanding undergraduate curriculum in Ireland, he then moved to England where he became Member of the Royal College of Surgeons. An avid proponent of the transurethral diathermy loop developed by McCarthy in New York, on December 1, 1946 he published a landmark paper in The Lancet, entitled “Retropubic Prostatectomy: A New Extravesical Technique” [16]. The new procedure was immediately considered an outstanding advancement in surgery and Millin’s operation contributed greatly to reducing mortality of open prostatectomy. Millin’s prostatectomy was rapidly exported in USA where it was first presented at the AUA meeting in Buffalo in 1947 and two years later it was first performed live in USA by Millin.

The patient is placed supine on the operating table with a slight Trendelenburg position in order to encourage venous drainage from prostatic bed, thereby reducing haemorrhage. A 10–15 transverse lower abdominal incision, 3 cm above the symphysis pubis is performed. The rectus and pyramidalis muscles are widely separated and the retropubic fat is gently separated to expose the bladder and the prostate. The three blades of a Millin retractor are introduced to better expose the anterior surface of the prostate and the bladder wall. Swabs can be placed in the paraprostatic gutters to dry the operating field from blood and make access to the peripheral prostate easier. Two stay sutures are then placed deep through the prostatic capsule, just
below the bladder neck, delimitating an area through which a transverse incision is made across the anterior prostatic capsule exposing the adenoma. To improve haemostasis, ligation of the dorsal venous complex and of the prostatic arteries, as they enter the prostatovesical junction, may be required [18]. After the adenoma is exposed, a pair of scissors is used to create a surgical plane between the adenoma and the capsule, blind dissection with the pulp of the index finger may also be used to complete the enucleation. The prostate apex is identified, urethra is carefully divided under visual control; proximal urethra is then also divided at the bladder neck. After the adenoma is completely freed from any attachment, it is removed and the prostatic capsule is packed with gauze swabs to control bleeding by direct pressure. All bleedings vessels are either coagulated under visual control or sutured, two absorbable sutures are normally placed at 5 and 7-o’clock position through the bladder neck and prostatic capsule to ensure haemostasis. The two initial stay sutures are tighten together. Drainage of the Retzius space is assured before closing the abdomen. Bladder irrigation is maintained until urine clear and catheter is usually removed 3 days later. Individual variations of the described technique are obviously possible.

The retropubic approach offers an ideal view of the prostate gland and prostate cavity after enucleation of the adenoma, allows direct visualization of the adenoma and prostatic urethra, and cause limited trauma to the urinary bladder.

2.3. Laparoscopic extraperitoneal Millin prostatectomy

The possibility to perform a Millin’s prostatectomy in laparoscopy was proven by Porpiglia and co-workers in 2005, the operation is challenging a its role in our armamentarium is yet to be defined. It may remain a technical exercise or it may be an additional step in the trend toward converting most urological procedures into laparoscopic surgery [29].

The patient lies on the table in lithotomic position. An incision is performed right below the umbilicus and an extraperitoneal space is developed like in the radical prostatectomy. A Hasson trocar is than inserted under the umbilicus and other 4 trocars (3 of 5 mm and 1 of 12 mm) are inserted in a fan shape. The anterior wall of, the prostate and the pelvic fascia are exposed; the superficial dorsal vein complex is coagulated. A transversal incision is performed on the anterior wall of the prostate capsule and the adenoma is bluntly dissected with the tip of scissors or Maryland dissection forceps from the anterior prostate capsule. The dissection is then completed and finally the adenoma is freed from the bladder neck. The sacral lip of the bladder neck is sectioned. When the adenoma is very large, each lobe can be freed and removed separately. Haemostasis is achieved using bipolar or monopolar forceps to secure small vessels while transcapsular arteries are sutured. Trigonisation is performed closing the midline incision through the sacral lip of the bladder neck and posterior surgical capsule with 3 stitches. A catheter is introduced, and the balloon inflated into the bladder. The prostatic capsule is closed with running or interrupted suture. Paravesical drainage is left in the pelvic area and the adenoma removed with an Endo-catch. The catheter is maintained for 3 to 5 days.

A laparoscopic transvescical approach has been proposed by Sotelo and co-workers and permitted the concomitant management of any coexistent intravesical pathology, such as bladder calculi [30].

3. Clinical outcome of open prostatectomy

Open surgical removal of prostatic adenoma remained the gold standard treatment of BPH for many decades. The conversion from open to transurethral surgery occurred gradually; open prostatectomy is still relatively common in some countries while has been almost abandoned in others. Results of many old papers on open prostatectomy should be interpreted with caution as many standards involving anaesthesiology, transfusion medicine, surgery and outcome research, changed in the last decades. Randomised studies of open prostatectomy versus TURP are scanty and no new trials are foreseen for ethical reason. Nevertheless, several studies indicate that open prostatectomy provides outstanding relief of bladder outlet obstruction and lower urinary tract symptoms [33–38]. In a landmark study, Meyhoff and co-workers demonstrated in a comparative randomised study that open prostatectomy is well accepted by patients with only 9% of patients were dissatisfied by treatment compared to 15% of the TURP group (Table 1) [39–41]. Tubaro and co-workers evaluated the 1 year clinical and urodynamic outcome of
patients treated with sovrapubic prostatectomy [36].

Open prostatectomy induces a significant reduction of symptom score and improvement of quality of life index after 1 year of treatment. Of the patients, 84% described themselves as delighted with the results obtained and none had a quality of life score greater than 3 with a mean value of 0.2. In their series 60% of patients become asymptomatic after treatment and 96.9% had a flow rate greater than 15 ml/sec. A significant improvement of voiding volume, post void residual volume and bladder wall thickness was also observed (Table 2). Varkarakis and co-workers have recently confirmed these data [37]. They retrospectively evaluated 151 patients who underwent open transvesical prostatectomy for BPH (prostate larger than 70 grams) during a five-year period. The improvement at 8 to 12 months, as documented by an increase in Qmax, decrease in PVR urine volume, and decrease in lower urinary tract symptoms and quality of life improvement, was statistically significant after the procedure and did not change significantly even after longer follow-up (41.8 months).

One of the main disadvantages of open prostatectomy is the high rate of morbidity which is generally higher than reported for transurethral surgery Table 1. Data reported in Table 3 show a large variability which may reflect improvement in

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**Table 1 – Outcome parameters of a randomized trial of transurethral versus transvesical prostatectomy [39–41]**

<table>
<thead>
<tr>
<th></th>
<th>N.</th>
<th>LUTS</th>
<th>Qmax</th>
<th>Morbidity</th>
<th>Patient’s dissatisfaction</th>
<th>Failure Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>TURP</td>
<td>43</td>
<td>−90%</td>
<td>+88%</td>
<td>53%</td>
<td>16%</td>
<td>4.6%</td>
</tr>
<tr>
<td>Open</td>
<td>32</td>
<td>−87.5%</td>
<td>+175.5%</td>
<td>68%</td>
<td>9%</td>
<td>0</td>
</tr>
</tbody>
</table>

**Table 2 – The effect of open prostatectomy on bladder wall thickness and other outcome parameters [38]**

<table>
<thead>
<tr>
<th></th>
<th>IPSS</th>
<th>QL</th>
<th>Voiding Volume (ml)</th>
<th>Qmax (ml/sec)</th>
<th>PVR (ml)</th>
<th>Bladder Wall Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>19.4 ± 4.4</td>
<td>4.9 ± 0.9</td>
<td>290 ± 9</td>
<td>9.1 ± 5.3</td>
<td>128 ± 113</td>
<td>5.2 ± 0.7</td>
</tr>
<tr>
<td>1 year</td>
<td>1.5 ± 2.7</td>
<td>0.2 ± 0.4</td>
<td>427 ± 82</td>
<td>29.1 ± 8.9</td>
<td>8 ± 18</td>
<td>2.9 ± 0.9</td>
</tr>
<tr>
<td>Difference</td>
<td>−18.5 ± 5.1</td>
<td>−4.7 ± 1.1</td>
<td>211 ± 107</td>
<td>+19.8</td>
<td>−124 ± 115</td>
<td>−2.3 ± 1</td>
</tr>
<tr>
<td>p ≤</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.001</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

**Table 3 – Overall complication rate in patients undergoing open prostatectomy**

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>N. pts</th>
<th>Any method</th>
<th>Retropubic</th>
<th>Transvesical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue and Campbell</td>
<td>[63]</td>
<td>1958</td>
<td>3.5</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>Stearns [64]</td>
<td>1961</td>
<td>500</td>
<td>11.4</td>
<td>11.4</td>
<td></td>
</tr>
<tr>
<td>Lenko [65]</td>
<td>1965</td>
<td>233</td>
<td>17.2</td>
<td>17.2</td>
<td></td>
</tr>
<tr>
<td>Beck [66]</td>
<td>1970</td>
<td>1,346</td>
<td>40.8</td>
<td></td>
<td>40.8</td>
</tr>
<tr>
<td>Nicol [67]</td>
<td>1974</td>
<td>525</td>
<td>18.3</td>
<td></td>
<td>18.3</td>
</tr>
<tr>
<td>Bollmann and Zigg [68]</td>
<td>1976</td>
<td>262</td>
<td>57.3</td>
<td></td>
<td>57.3</td>
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<tr>
<td>Lund and Dingor [69]</td>
<td>1976</td>
<td>67</td>
<td>46.5</td>
<td></td>
<td>46.5</td>
</tr>
<tr>
<td>Lenko [70]</td>
<td>1977</td>
<td>227</td>
<td>21.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Davillas [71]</td>
<td>1978</td>
<td>1,000</td>
<td>12.5</td>
<td>12.5</td>
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<tr>
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<td>1983</td>
<td>360</td>
<td>28.5</td>
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<td>28.5</td>
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<td>Lesiewicz [73]</td>
<td>1985</td>
<td>250</td>
<td>43.6</td>
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<td>43.6</td>
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<td>Murshidi [74]</td>
<td>1989</td>
<td>60</td>
<td>28.6</td>
<td></td>
<td>28.6</td>
</tr>
<tr>
<td>Lewis [76]</td>
<td>1992</td>
<td>73</td>
<td>36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meier [49]</td>
<td>1995</td>
<td>240</td>
<td>19.6</td>
<td></td>
<td>19.6</td>
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<tr>
<td>Meazini [77]</td>
<td>1998</td>
<td>1,051</td>
<td>13.6</td>
<td></td>
<td>13.6</td>
</tr>
<tr>
<td>Condie [78]</td>
<td>1999</td>
<td>200</td>
<td>14</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>Tubaro [38]</td>
<td>2001</td>
<td>32</td>
<td>31.2</td>
<td></td>
<td>31.25</td>
</tr>
<tr>
<td>Serretta [42]</td>
<td>2002</td>
<td>1,804</td>
<td>36.9</td>
<td></td>
<td>36.9</td>
</tr>
<tr>
<td>Adam [45]</td>
<td>2004</td>
<td>201</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varkarakis [37]</td>
<td>2004</td>
<td>232</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>9879</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td></td>
<td>21.8</td>
<td>14.8</td>
<td>26.2</td>
<td></td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td></td>
<td>25.7</td>
<td>24.2</td>
<td>26.2</td>
<td></td>
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</tbody>
</table>
anaesthesia techniques and patients care over the years but also reflects variability in how morbidity was measured. Nowadays, better patients selection, better anaesthesia techniques, change in transfusion policies, and improvement of surgical standards may be responsible for the observed decrease in complication rates. The overall rate of morbidity and mortality associated with open prostatectomy is considered to be lower than reported in the early seventies. Intraoperative and peri-operative haemorrhage still is associated with open prostatectomy and transfusion rate is still a major concern. In the series evaluated by Tubaro and co-workers an autologous blood unit was transfuse in the 68% of patients evaluated. Other reports showed a 11.2% of severe bleeding who necessitate of blood transfusion in 73% of patients [42]. Considering an overall 23% transfusion rate after this procedure (AUA guidelines), it may still be prudent to have 1 to 2 units of autologous blood available at the time of open prostatectomy. Wound complication or urinary fistula can also be of concern in the immediate postoperative period in the 0.4–4% of patients [42,37]; this most likely results from an incomplete closure of the prostatic capsula in retropubic prostatectomy or the cystotomy in suprapubic prostatectomy [42,37]. This complication will usually resolve spontaneously and is managed with continued catheter drainage.

Hospital stay is usually longer with open procedures with a mean hospitalisation ranging from 6 to 10 days in the modern series and it is due to a median of 5 day of catheterisation time [36,37,42]. Urinary tract infection is a rare complication (6–8%) thanks to the modern antibiotic prophylactics and is comparable to that observed after TURP [4]. Urinary incontinence is a rare event after open prostatectomy and should be minimised by a precise enucleation of the prostatic adenoma with a minimal risk of injury to the external sphincter. Late urologic complications are not common and include bladder neck contractures (BNC) and urethral strictures with an incidence comparable to TURP (2–20%). Erectile dysfunction occurs in 3% to 5% of patients undergoing an open prostatectomy; it is more common in older men than in younger men. Retrograde ejaculation in another common complications after open procedures and is observed in 80% to 90% of patients. Deep vein thrombosis, pulmonary embolus, myocardial infarction, and a cerebral vascular event are observed in less than 1% of open prostatectomy with an overall mortality rate which approach zero [4,5]. Failure rate is also extremely low and is estimated between 0 to 8% [4]. Outcomes of open prostatectomy versus TURP as evaluated by the American Urological Association guidelines are summarised in Table 4.

4. Cost analysis

Analysis of direct and indirect costs suggests that open prostatectomy is the most expensive surgical procedure for BPH. An old analysis from a 1994 AHCPR document, based on Medicare data for the years 1988–89, shows an average 12,788 US$ for open prostatectomy (costs for primary treatment and 1 year follow-up) versus an average of 8,606 US$ for TURP, the costs for second year of treatment after primary treatment were 69 and 360 US$, respectively [5]. The higher costs of treatment are obviously related to the longer hospital stay while the lower expenses after primary treatment are instead related to the lowest re-treatment rate of open surgery. Is the additional cost worth while? Notwithstanding the paucity of randomised trials, the answer is probably not as the outcome of holmium enucleation already proved comparable to open surgery at a much lower cost [43]. From a surgeon perspective, money is certainly not a premium category for decision making but costs certainly include intangible ones such as treatment burden and in this respect any treatment allowing early patient discharge, reduced time away from work and social activities, and particularly the possibility to mange patients as a day case, may well play a fundamental role in decision making, particularly in Europe.

5. Postgraduate training

Open prostatectomy, either performed through a retropubic or a transvescical approach, is not an easy procedure and a long learning curve is expected. The decreasing number of procedures performed in western countries may jeopardise...
adequate postgraduate training for our future residents. In the last years in USA and Europe we assisted to a significant reduction in the number of surgical procedures performed for BPH due to the success of medical therapy and various alternative treatments. The decreasing number of endoscopic procedures may even make difficult to guarantee our residents enough cases to secure proper training in transurethral resection of the prostate. When the option is available, surgeons often prefer a surgical technique they are most familiar with, and many urologists might prefer TURP or minimally invasive treatment even in large glands because they will not be comfortable with open prostatectomy. Academic medicine should make sure residents in urology receive adequate training for proper management of large prostate glands and one of the new endoscopic techniques (holmium or KTP laser) will probably be the new standard. Laparoscopic prostatectomy is a difficult operation and the chance of being adopted widely are nil. A recent analysis of the PharMetrics Patient-Centric Database (from July 1999 to June 2002) showed that open prostatectomy accounted for 0.1% of BPH surgery in USA [44]. The case, at least in that country, is closed, after a good hundred years postgraduate training in open prostatectomy is over. The fate of the operation in Europe is yet to be decided, although some plea for maintaining open prostatectomy in our resident curriculum [45] this will depend upon the availability of enough cases for our residents.

6. Current indications

Open prostatectomy is one of the oldest surgical procedures in urology. It has been used for more than 50 years as the standard treatment until TURP became the new gold one. Open prostatectomy is certainly a valuable option in less developed areas of the world where there is no access to transurethral surgery and BPH is frequently managed by general surgeons [46–48]. Improved surgical techniques achieving optimal control of bleeding from the bladder neck can achieve morbidity rates which compare favourably with TURP series [49]. In Europe, open surgery is still performed in the two digit range: 12% in Sweden, 14% in France, 32% in Italy and 40% in Israel showing how this is still considered a valuable option, while it remains in the one digit range in UK, Australia and USA [37,50,44]. Open prostatectomy has been reserved for the management of large prostate glands. Steg reported an average weight of enucleated tissue of 61 grams in open prostatectomy series versus 25 grams in TURP series [51]. The Vth International Consultation on BPH considered that open prostatectomy remains indicated in patients with prostate larger than 80–100 grams and in patients with coexisting disorders which may benefit from their repair at the same time of prostatectomy: such as hernia, large bladder stone and diverticula [52–58].

Although open prostatectomy was first developed as a transvesical procedure which was then perfected by Hritschack, following to the introduction of the retropubic approach by Terence Millin a large number of surgeon embraced the new technique. Surgeons’ preference mostly depends on training, when one of the two techniques is mastered, it is difficult to adopt the other approach. The discussion on the pros and cons of either technique has now been ongoing for decades, retropubic prostatectomy is considered to have a lower rate of complications compared to the transvesical approach (23.8 versus 42.2%, respectively) [5]. Data summarised in Table 3 confirm the large variability of complication rate reported in the peer-review literature (from 3.5 to 57.3, mean 21.8, median 25.7) depending on which complications were considered and how they were measured. Our analysis confirms the higher rate of adverse events in sovrapubic prostatectomy (Table 3). Although the use of a transvesical approach might be more reasonable when a bladder comorbidity exists (e.g., large bladder stone or diverticula) and the retropubic approach may be preferred in all other circumstances, we doubt that many surgeons will feel confident to switch operation easily and training will continue to be based upon the experience (retropubic or transvesical) of the individual centre/surgeon.

Some of the new transurethral techniques, such as holmium enucleation and photoselective vapourisation of the prostate with KTP laser, already proved efficacious in dealing with large prostates [59,60]. The implementation of these two technique will probably make open prostatectomy redundant in specialised centres although they have not become yet the gold standard for the treatment of large prostate glands. Holmium enucleation suffers a long learning curve and significant capital investment which may limits its availability outside large institutions [61]. Photoselective vapourisation is still a very young technique with a very short logbook. Although 5-years data have been recently published, these data need to be confirmed in extramural studies [62].

7. Conclusion

Surgeons easily become sentimental with procedures which served well for so many decades. It is
impossible to calculate how many patients benefit from open prostatectomy since the procedure was introduced more than 100 years ago but the procedure was long considered one of the distinctive features of our specialty. In a world dominated by financial issues, all national health systems have been forced to reconsider allocation of resources, the inevitable trend toward reducing the number of inpatient beds, increasing day case surgery and lowering treatment costs already favoured alternative surgical techniques such as transurethral resection and holmium enucleation. Planning of postgraduate training programmes in urology must balance the time and costs of training a resident for a certain surgical procedure with the future needs the new generation of urologists will have to fulfill. In a time when many countries consider now to plan differential training schemes for consultant urologists and consultant urological surgeons, teaching open prostatectomy is almost certainly redundant. This is not cause for sadness, many urological operations passed and new interventions were introduced. Failure to adapt is a major risk particularly in a lively area such as medicine and surgery. Open prostatectomy remains a nice operation in the western world and it is bound to disappear; it will certainly be replaced by techniques not yet available. Open prostatectomy is almost certainly redundant. This is not cause for sadness, many urological operations passed and new interventions were introduced. Failure to adapt is a major risk particularly in a lively area such as medicine and surgery.

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CME questions

Please visit www.eu-acme.org/europeanurology to answer these CME questions on-line. The CME credits will then be attributed automatically.

1. What is the mean complications rate of open prostatectomy reported in the peer review literature?
   A. >15%
   B. >20%
   C. >25%
   D. >30%

2. The 5-year projected failure rate of open prostatectomy is
   A. 2%
   B. 4%
   C. 6%
   D. 8%

3. In 1995, the percentage of open prostatectomy procedure in USA in all surgical procedures for BPH was
   A. <1%
   B. <5%
   C. <10%
   D. <15%

4. The overall transfusion rate for open prostatectomy is
   A. >5%
   B. >10%
   C. >20%
   D. >30%

5. Terence Millin was
   A. Irish
   B. English
   C. American
   D. French

6. The incidence of erectile dysfunction following open prostatectomy is
   A. 0–3%
   B. 3–5%
   C. 5–10%
   D. 10–1%