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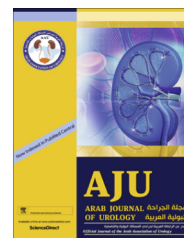
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ANDROLOGY/SEXUAL MEDICINE  
ORIGINAL ARTICLE

# The Egydio geometrical procedure for managing penile curvature using a single relaxing incision: A single-centre experience with 330 patients



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## KEYWORDS

Peyronie's disease;  
Penile curvature;  
Surgical management

## ABBREVIATIONS

ED, erectile  
dysfunction;  
NVB, neurovascular  
bundle

**Abstract Objective:** To present our 3-year experience with the Egydio's geometrical procedure for managing penile curvature with some modifications.

**Patients and methods:** In all, 330 patients (mean age 51 years) that underwent the Egydio's procedure as day cases were included in this study.

**Results:** The mean penile curvature was 45° and 27.3% of the patients reported mild erectile dysfunction (ED) preoperatively. Partial excision of the calcified plaque was performed in 12.1% of the patients. Partial glans necrosis was recorded in one patient, while haematoma was recorded in 9%, and delayed wound healing in 3%. There was residual curvature (mean 20°) requiring reoperation in 8.2% of the patients. In all, 10% of the patients were dissatisfied with their results, while of the remainder, 75.2% were totally satisfied and 14.8% partially satisfied. ED was reported in 31.8% of the patients (moderate: 17.3% and significant: 2.7%).

**Conclusions:** The Egydio geometrical technique for the treatment of penile curvature seems to be a simple, reproducible, safe, and efficient operation.

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## Introduction

Peyronie's disease negatively affects a couple's quality of life and in most cases in its chronic phase requires surgical restoration of the penile axis [1,2]. Several surgical techniques have been proposed to treat the chronic phase

of Peyronie's disease [1], with both plication and grafting procedures considered effective for the correction of the penile curvature. The decision of the appropriate surgical technique is based on the preoperative penile characteristics such as the length, the degree of deformity, and possible concomitant erectile dysfunction (ED).

In 2002, Egydio et al. [3] presented a technique for penile curvature restoration in which a single relaxing incision is made to the tunica albuginea at the point of maximum curvature followed by the closure of the newly created tunical defect with a graft. This technique is based on simple geometric principles, which create a rectangular tunical defect easy to graft in almost all cases of penile curvature [3].

In the present study, we present our experience with the use of the Egydio technique with personal slight modifications in order to simplify surgical management of Peyronie's disease.

### Patients and methods

From January 2009 to December 2012, 330 patients underwent surgery for penile curvature using tunical incision or partial plaque excision and grafting according to the Egydio technique. In all patients, penetration was extremely difficult due to the degree of penile curvature. The decision for surgery was taken according to the guidelines of the European Association of Urology after conservative treatment had failed [4]. Also, penile deformity (curvature, narrowing, or indentation) and plaque formation were stabilised, and pain was absent for  $\geq 6$  months. Furthermore, patients should be preoperatively potent or have only mild ED according to the five-item brief form of the International Index of Erectile Function. Informed consent was obtained from each patient. Patient characteristics (age, degree of curvature, penile deformity, ED) are detailed in Table 1. Follow-up visits were scheduled at 1 week after surgery and at 3 months postoperatively, and then every 6 months.

#### Surgical technique

A circumcision incision was made and the penile skin was retracted to the base of the penis revealing Buck's

fascia. A Penrose elastic loop was applied as a tourniquet at the base of the penis and one cavernosal body was punctured with a 21 G butterfly needle. Normal saline solution was injected to induce a full erection and the point curvature was measured. Two small (2–3 cm) longitudinal paraurethral incisions were made and using blunt dissection the Buck's fascia and its neurovascular bundle (NVB) were separated from the underlying tunica albuginea. Both Buck's fascia and the NVB were retracted away from the operating field using a Penrose loop. A transverse incision forked at both ends (120°) on the circumferential line at the point of maximum curvature was made, creating a rectangular tunical defect. The Penrose loop was retracted and cut at the tunical defect's maximum length. A second Penrose loop was placed over the defect and cut at the defect's maximum width. Both Penrose strips (representing the defect's length and width) were used as references to cut a rectangular shaped graft having the same dimensions as the tunical defect. In case of significant plaque calcification interfering with graft placement, partial plaque excision was performed.

For the graft we used Surgisis® (Cook Surgical, Bloomington IN, USA) in all cases. The graft was placed over the tunical defect and sutured to the tunica albuginea by using continuous suturing with 3-0 polydioxanone. A new erection was induced to confirm the straightening of the penile shaft and the water tightness of the suturing line. Buck's fascia was repositioned to the paraurethral incision lines by using 3-0 polyglactin 910 (Vicryl®) with a cutting needle. A circumcision was performed before re-gloving the penis and the relevant incision was closed with 3-0 polyglactin 910 Rapid (Vicryl Rapid). The penile shaft was dressed with a self-adhesive bandage to prevent the development of postoperative haematoma. The bandage was removed on the seventh postoperative day and patients were recommended to refrain from sexual intercourse for 6 weeks. Penile rehabilitation with tadalafil 5 mg was offered to all patients. In cases of residual penile curvature after 6 months, a reoperation was performed.

### Results

All operations were undertaken on a day surgery basis and patients were discharged on the same evening. The mean (range) operative time was 70 (65–90) min. Partial plaque excision was deemed necessary in 40 patients (12.1%) due to significant calcification interfering with graft placement. The most significant complication was a case of partial glans necrosis following distal thrombosis of the cavernosal arteries in a patient with diabetes mellitus. This was managed by surgical ablation of the necrotic tissue as a first step and glans reconstruction at a second stage. Most postoperative complications were minimal including mild haematoma formation in

**Table 1** The patient's characteristics.

Characteristic	Value
Number of patients	330
Mean (range) age, years	51 (21–73)
Mean (range) degree of penile curvature, °	45 (30–90)
<i>Penile deformity, n (%)</i>	
Dorsal	156 (47.3)
Dorsolateral	100 (30.3)
Ventral	30 (9.1)
Ventsrolateral	44 (13.3)
Preoperative mild ED, n (%)	90 (27.3)

30 patients (9%) and delayed wound healing in 10 (3%). Haematoma formation was managed with puncture and/or haematoma evacuation. Delayed wound healing was treated conservatively with antibiotics. At 3 months postoperatively 90% of patients were satisfied (75.2% totally, 14.8% partially). Re-operation due to residual penile curvature (mean 20°) was performed in 27 cases (8.2%). There was significant postoperative ED not responsive to oral tadalafil in nine patients (2.7%). Perioperative and follow-up data are presented in Table 2. There were no graft rejections.

## Discussion

There is no easy answer to the difficult question of the ideal operation for the treatment of Peyronie's disease [5]. The Egydio technique, using a single relaxing incision forked at both ends (i.e. modified 'H' or 'YY' incision) to restore penile curvature followed by graft placement, is currently considered an attractive approach for the surgical correction of an underlying penile curvature [3,6]. In a multicentre study, the long-term results of the Egydio technique were published in a group of 157 patients with Peyronie's disease [7]. After a median follow-up of 20 months mild residual curvature was recorded in 12% of the patients, while all patients recovered their ability to penetrate with no difficulty. To the best of our knowledge this is the largest reported series of patients undergoing the Egydio technique in a single centre. By building up our experience with this operation and introducing some modifications, we have reduced the operative time. After the establishment of the two paraurethral incisions, using blunt dissection, we create

a tunnel underneath Buck's fascia and it's NVB above the two cavernosal bodies. A pair of scissors is introduced inside the created tunnel and its handles are opened widely forcing Buck's fascia and it's NVB to separate from the underlying tunica albuginea.

The Egydio's procedure is based on simple geometric principles and uses mathematical calculations to measure the precise dimensions of the required graft [3,6]. Other authors have also incorporated formulas using goniometric data to extract the exact shape of the tunical defect [8]. Our technique to use a Penrose loop to measure the tunical defect length and width simplifies graft preparation. All graft calculations based on this simple technique restored penile curvature without the need of additional plication techniques. During Buck's fascia closure we found that suturing was greatly assisted by the deep dissection of the paraurethral tissue, exposing enough tissue to handle and suture with the Buck's fascia.

Usually, the technique presented does not regularly require plaque excision. A single incision over the scared tissue was enough to restore penile curvature in most cases. Nevertheless, 40 of our present patients presented with a significantly calcified plaque at the site where the incision of the tunica albuginea took place, restricting the tunical edges from creating the desired rectangular defect. Based on the fact that total plaque excision is associated with significant postoperative ED [9], we usually do not perform a full-length plaque excision but we partially and superficially excise calcified tissue taking care not to damage the underlying cavernosal tissue.

Current graft technology provides a great range of graft materials to be used for the restoration of tunica albuginea defects [10,11]. However, we still do not know which is the ideal technique and graft material [12,13]. Surgisis is a biological graft derived from porcine small intestine submucosa. Our experience with this material has been satisfactory, not only due to its easy manipulation and suturing during the procedure but also due to the postoperative results. We did not record graft contracture during the follow-up, while during re-operations for residual curvature 6-months postoperatively, we noticed that the graft was fully incorporated into the tunical tissue. Interestingly, buccal mucosa grafting has not been highlighted in many review articles and relevant clinical studies are limited. Recently, Zucchi et al. [14] reported the results of 32 cases of corporoplasty with buccal mucosa graft and they concluded that it was easy to perform and that it represented a good and cheap treatment option for most forms of Peyronie's disease.

Fibrosis of the corpora cavernosa is associated with severe ED. Egydio and Kuehhas [15] reviewed conservative medical therapy for corporal fibrosis and surgical therapeutic methods. Conservative treatment options (i.e. phosphodiesterase-5 inhibitors and pentoxifylline)

**Table 2** Perioperative and functional outcomes.

Characteristic	Value
Mean (range) operative time, min	70 (65–90)
<i>n</i> (%)	
Significant calcified plaque requiring partial excision	40 (12.1)
<i>Postoperative complications</i>	
Haematoma	30 (9)
Delayed wound healing	10 (3)
Partial glans necrosis	1 (0.3)
<i>Postoperative satisfaction at 3 months</i>	
Satisfied totally	248 (75.2)
Satisfied partially	49 (14.8)
Dissatisfied	33 (10)
Residual curvature requiring re-operation at 6 months	27 (8.2)
Mean (range) residual curvature in cases requiring re-operation, °	20 (15–28)
<i>Postoperative ED at 3 months, n (%)</i>	
Mild	39 (11.8)
Moderate	57 (17.3)
Significant	9 (2.7)

can be applicable in the early phase, but simultaneous corporal reconstruction procedures with concomitant implantation of a penile prosthesis should be performed in severe cases of corporal fibrosis [15]. Also, penile fibrosis after pelvic fracture or self-induced penile fractures results in severe ED [16,17]. Of course, penile prosthesis surgery is an integral part of the treatment of severe ED when non-surgical options fail or are contraindicated [18].

In conclusion, the Egydio geometrical approach to restore penile curvature using a single relaxing incision followed by grafting seems to be a safe, reproducible, easy, and effective technique. Graft sizing can be simplified to simple length and width measurements over the tunical defect avoiding complicated mathematical formulae, without compromising the effectiveness of the procedure. Favourable outcomes in terms of curvature restoration and preservation of potency were achieved in most of our patients.

#### Conflicts of interest

None disclosed.

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None.

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