

SURGERY

Circumferential Acquired Macropenis: Definition, Literature Review and Proposal of Geometrically-Based Reduction Corporoplasty



Edoardo Stefano Pescatori, MD,¹ Barbara Drei, MD,¹ and Salvatore Rabito, MD²

ABSTRACT

Introduction: Over the years, scattered cases of acquired penile girth increase have been published with different terms, the common clinical feature being a mechanically hampered penetration.

Aim: To search for all published cases of acquired penile girth increase, and to propose a geometrically-based reduction corporoplasty.

Methods: A case of acquired penile bilateral albuginea herniation prompted us to a PubMed, EMBASE and Google Scholar literature review from 1970 to 2021, in search for similar conditions.

Main Outcome Measure: We identified 7 cases of acquired penile girth increase; the geometric approach used to surgically correct bilateral corporal herniation proved successful in our case.

Results: In 5 of the 7 cases of acquired penile girth increase, priapistic episodes were deemed the causal factor; in the remaining 2 and in ours, a clear etiology could not be identified.

Conclusion: “Circumferential acquired macropenis” describes the unusual syndrome of acquired penile girth increase, that encompasses 2 distinct etiologies: post-priapistic cases, characterized by penile girth increase both in flaccidity and erection, and idiopathic cases, characterized by girth increase in erection only, and at surgery by a thinned albuginea in the affected area. **Pescatori ES, Drei B, Rabito S Circumferential Acquired Macropenis: Definition, Literature Review and Proposal of Geometrically-Based Reduction Corporoplasty. Sex Med 2022;10:100460.**

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Key Words: Penis; Circumference; Girth; Dimensions; Erection; Megapenis; Macropenis; Megalophallus; Dyspareunia; DICC

INTRODUCTION

Penile dimensions enter the medical scenario almost exclusively as concerns about being too low: Urologists devoted to Andrology not seldom receive the request of lengthening and/or widening phalloplasties, while it is an absolute rarity, if ever, to receive a complaint of excessive penile length or girth.

A recent case that presented us a man that developed a critical girth penile increase, causing dyspareunia and preventing the possibility of a full penetration with his wife, prompted us to review the existing medical literature, in search of similar conditions and their management. The purpose of our contribution is to define this unusual, but definite clinical entity, with the unifying term of “circumferential acquired macropenis,” and to illustrate our geometrical surgical approach to this condition.

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¹Servizio di Andrologia, Hesperia Hospital, Modena, Italy;

²UO Urologia, Hesperia Hospital, Modena, Italy

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MATERIALS AND METHODS

Narrative Literature Review

Prompted by our case, we performed a PubMed, EMBASE and a Google Scholar search from January 1970 to July 2021, restricted to English language materials, to identify all articles



Figure 1. Erect penis at presentation.

and meeting abstracts of interest, related to our review purpose, using the following terms: penis girth, penis circumference, wide penis, corporal herniation, megapenis, macropenis, dilatation of corpora cavernosa, megalophallus.

Description of Our Case

Presentation. A 55 year-old man presented a complaint of progressive aneurysmal deformation of the middle two thirds of the shaft that started 2 years earlier, and stable for the last 3 months (Figure 1). Such deformation produced a maximal girth of 21 cm, that caused his wife's dyspareunia at intercourse attempts, with only partial penetration (distal third of the penis). Rigidity was unchanged. He denied previous priapistic episodes, and all possible causes of penile trauma, including: former penile

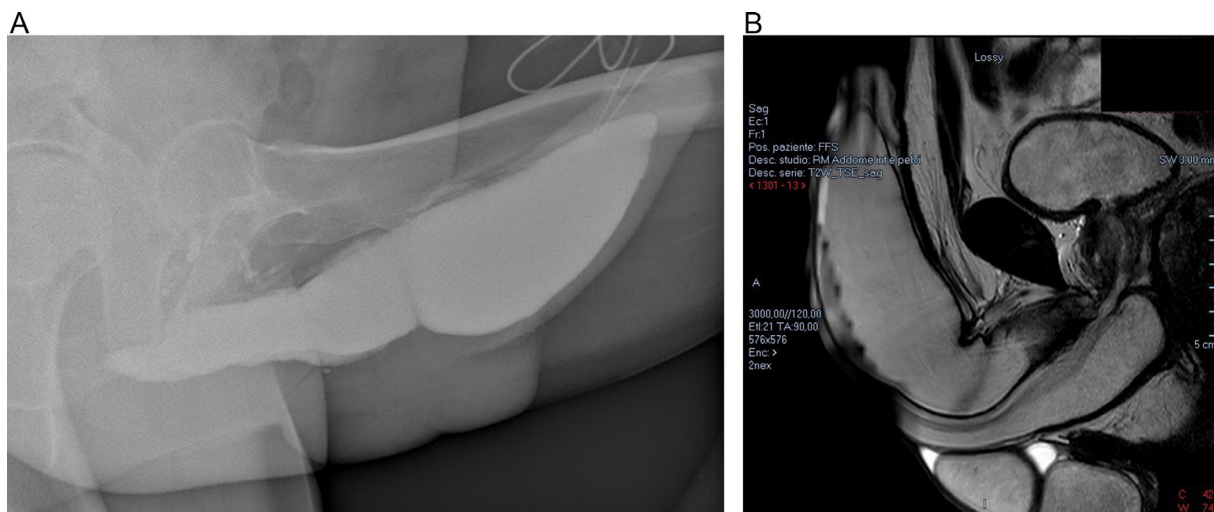
surgery, intracavernosal injections, trauma or penile fracture, uncommon practices such as taquandin, jelqing, any special form of masturbation, penile extender device, vacuum pump and penile ring use. His hemoglobin S evaluation test was negative. At physical examination, his penis appeared overall normal in the flaccid status; no fibrotic areas were detected.

Workup. At DICC, cavernosometry ruled out vascular problems, i.e. cavernosal arterial insufficiency and veno-occlusive dysfunction. The cavernosographic phase of DICC, along with dynamic MRI, showed a symmetric, sharp dilatation of the 2 corpora profile at the shaft middle two thirds (Figure 2A–B).

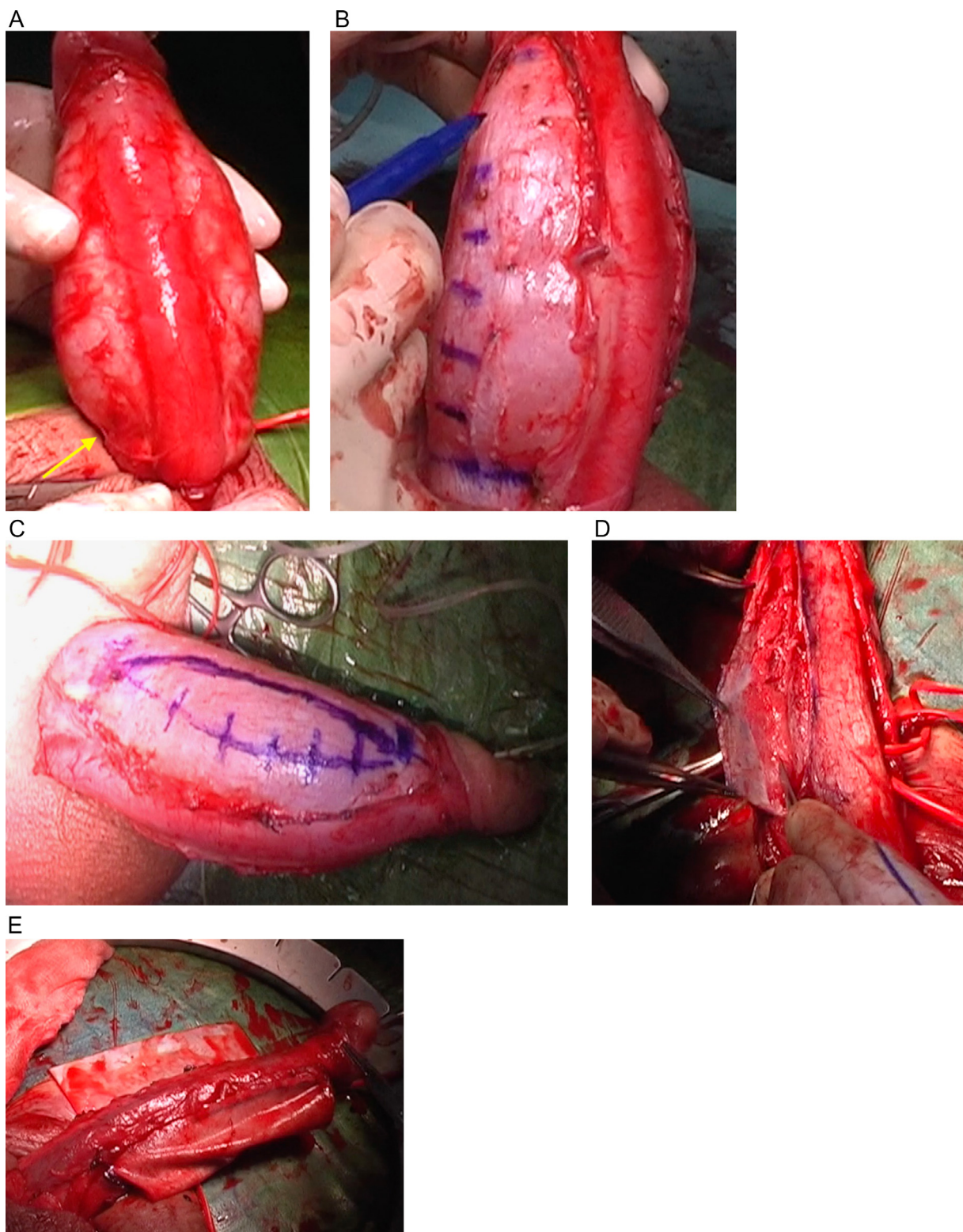
In planning surgery, we considered that previous reports of idiopathic cases described, at surgery, a thinned albuginea in the shaft widened area.^{1,2} Accordingly, we decided to reinforce all the area of thinned albuginea with a graft of cross-linked bovine pericardium. The patient consented in writing to this surgery, to video-recordings of the procedure and to the use of recorded materials for scientific purposes.

Geometrically-Based Surgical Procedure. Key surgical steps are depicted in Figure 3A–E; the scheme of the geometrically-based approach is presented in Figure 4.

Following a circumcising incision, the degloved shaft was extruded through a midline scrotal incision. At hydraulic erection a sharp transition, from a normal thickness appearing albuginea to a thinned albuginea, was appreciated (Figure 3A). We performed Buck's fascia elevation comprehensive of dorsal neurovascular bundle, bilateral paraurethral marking of defined reference intervals along the dilated aspect of the albuginea (Figure 3B), measurement of proximal (14 cm) and distal (12 cm) normal, “target” circumferences (C_t' and C_t ” see below)



Figures 2. A, B: (A) dynamic cavernosography during DICC; (B) dynamic MRI image.



Figures 3. A–E: key surgical steps in our case. (A) degloved, extruded penis under hydraulic erection: arrow shows the point of transition from normal to thinned albuginea; (B) marking reference points for subsequent circumferential measurements; (C) albuginea ellipse geometrically defined; (D) separation of cavernosal tissue from thin albuginea that will be excised; (E) bovine pericardium patch sutured to the right paraurethral albuginea.

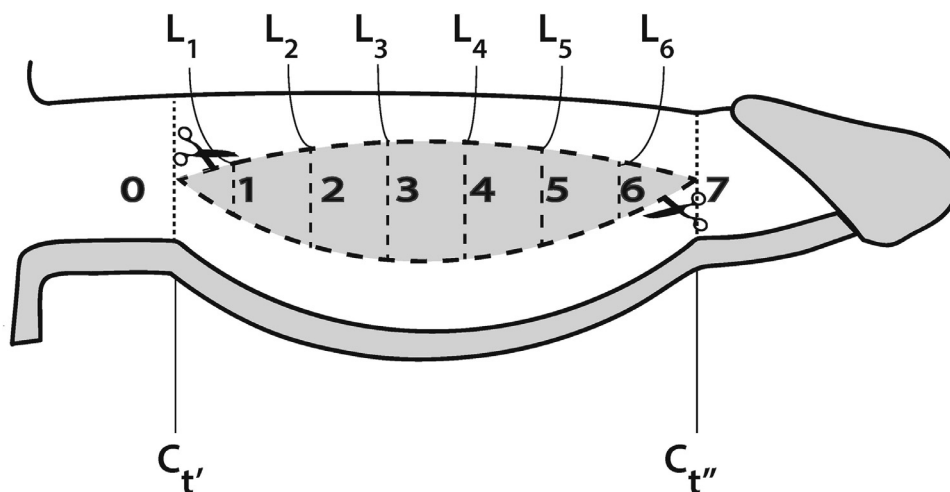


Figure 4. scheme of calculation for geometrically-based definition of albuginea ellipses to be excised. 0–7 = reference points where circumferential measurements are acquired; L_{1-6} = segments resulting as differences between measured circumferences and target reference sections; C_t' = target circumference at reference section 0; C_t'' = target circumference at reference section 7.

according to perception of normal thickness albuginea, and circumferential measurements at the level of the marked reference sections. Then, it has been calculated the differences between: the measured circumferences and the target circumferences. Each resulting difference was divided by 2, to identify the final measurements that allowed to bilaterally draw the ellipses of albuginea to be excised, in order to correct the circumference of both corpora (Figure 4).

Such measurements can be mathematically translated by the expression:

$$Li = \frac{1}{2} \cdot (Ci - Ct)$$

where:

L_i = calculated length (in cm) at each given section i (i from 1 to 6 of Figure 4) to bilaterally define the albuginea ellipse to be excised;

C_i = circumference measures at given section i ;

C_t = target circumference expected at the end of surgery.

In our case we already had 2 natural target circumferences:

C_t' = circumference measured at section 0 (Figure 4);

C_t'' = circumference measured at section 7 (Figure 4).

Accordingly, in order to obtain a final harmonious conic-shaped shaft, we decided for the following C_t values for the different given sections:

$$C_t = C_t' \text{ sections } 0, 1, 2;$$

$$C_t = \frac{1}{2} \cdot (C_t' - C_t'') \text{ sections } 3, 4;$$

$$C_t = C_t'' \text{ sections } 5, 6, 7.$$

The above expression implies that the bilateral corporal dilatation is symmetrical, i.e. at the same extent in each of the 2 corpora cavernosa, as it was the case in our patient, and as it appears to be a constant finding in the published cases of penile girth increase (see below). Of note, in a case in which the target penile shaft would be cylindrical - and not conic, as in our case - a single target circumference C_t should be considered, in place of the above C_t' and C_t'' values.

The 2 albuginea ellipses (Figure 3C) were freed from the underlying cavernosal tissue (Figure 3D) and removed. Bilaterally, the 2 albuginea margins were closed with a continuous water-tight suture in 20 Vycril (Ethicon). In all the affected aneurysmal area, albuginea was very thin. To prevent possible recurrences of albuginea herniation, a patch of bovine pericardium (Synovis Supple Peri-Guard) was fashioned according to the target erect shaft dimensions, allowing an extra-0,5 cm for suture bite. Such patch was anchored with cardinal stitches at the paraurethral albuginea (Figure 3E), and proximal and distal limits of the affected area in the dorsal midline.

Bucks' fascia was then re-approximated, and standard circumcision performed. No drain was used.

The patient was discharged the following day. Postoperative course was uneventful. He resumed sexual activity 60 days following surgery; in the postoperative period he was instructed to use the penile stretching device Penimaster PRO³ to allow for optimal patch take, in maximal penile extension.

RESULTS

Narrative Literature Review

We retrieved 5 peer-reviewed papers^{1,4-7} and 2 abstracts^{2,8} reporting of an overall 7 cases of penile girth increase. Our case adds up to the above 7 ones.

Table 1. Key clinical characteristics of all published cases, and of our case, of penile girth increase.

Year (ref.)	Age	Main complaint	Etiology	Time for develop-ment	Maximal erect girth (cm)	Penile affected area	Deformity present in:	Associated findings	Potency	Intraop. finding	Pathol.	Surgery	FU
1977 (4)	30	partner dyspareun.	SCD and priapism	7 y	18	whole shaft	erection and flaccidity	-	Yes (history)	n.a.	n.a.	n.a. only lubricant	n.r.
1995 (1)	63	penile mass	-	months	-	proximal third	erection	-	Yes (history, doppler, DICC)	thin tunica	unrem.	Nesbit-like	6 mo
2000 (5)	38	n.r.	SCD and priapism	n.r.	19,5	proximal two thirds	erection and flaccidity	hypoxic corpora at MRI	Yes (history)	n.a.	n.a.	n.a.	n.r.
2002 (6)	35	penetration impaired	SCD and priapism	2 y	n.r.	n.r.	n.r.	-	Yes (history)	n.r.	n.r.	Corporoplasty	n.r.
2004 (8 ab)	33	new penis size judged nonfuncio-nal	SCD and priapism+ Winter shunt	n.r.	21	whole shaft	erection and flaccidity	fibrotic corpora	No (history + intracav. injection of papaver.)	fibrotic tissue	n.r.	Nesbit-like + prosth. + tunica graft	n.r.
2015 (7)	17	penetration impossible	SCD and priapism	5 y	25	distal two thirds	erection and flaccidity	-	Yes (history)	-	-	Nesbit-like	postop visits
2016 (2 ab)	60	penetration impossible, partner dyspareun.	-	“progres-sive”	16	proximal third	Erection	fibrotic change at mid-shaft	Yes (history)	thin tunica	thin tunica	Nesbit-like	6 mo
2019 Our case	55	penetration impaired, partner dyspareun.	-	2 y	21	mid two thirds	erection	-	Yes (history, DICC)	thin tunica	unrem.	Geom. Nesbit-like + patch	19 mo ongoing

ab = Conference abstract; DICC = Dynamic Infusion Caverosometry Caverosography; dyspareun. = dyspareunia; FU = follow-up; Geom = geometrically; intracav. = intracavernosal; MRI = Magnetic Resonance Imaging; n.a. = not applicable; n.r. = not reported; papaver. = papaverine; Pathol. = Pathology report; prosth. = prosthesis; (ref.) = reference number at bibliography; SCD = sickle cell disease; unrem. = unremarkable.

**Figure 5.** Final result at 12 months follow-up.

The key clinical characteristics of all cases, including ours, are reported in [Table 1](#).

Follow-Up of Our Case

At 19 months follow-up the patient is maintaining a normalized penile shape ([Figure 5](#)), he has a regular sexual activity with dyspareunia resolution and full patient-partner satisfaction. His IIEF scores changed following surgery as follows: EF domain from 21 to 27, intercourse satisfaction domain from 6 to 10, and overall satisfaction domain from 6 to 9.⁹ Follow-up is ongoing.

DISCUSSION

In the medical literature there are scattered reports of too wide penises to allow effective penetration.

We retrieved 7 reports of excessive penile girth cases,^{1,2,4–8} with our one being the eighth ([Table 1](#)). The terms used to describe this condition were: megalophallus,^{4,5,8} aneurysmal dilatation of corpora cavernosa,^{2,7} spontaneous corporal herniation,¹ megalopenis.⁶ In all cases, the excessive shaft circumference was an acquired condition, developing after a variable length of time: from months to years. The site and extension of penile widening varied across cases, but in no one the glans was involved.

In most cases an underlying sickle cell disease, which determined priapistic events, has been causally linked to the development of penile girth increase^{4–8}; it has been proposed that a

permanent loss of elasticity of tunica albuginea is the result of a particularly intense priapism.⁵ In 3 cases, including ours,^{1,2} nonetheless, no underlying medical condition was present.

Erectile capability was retained in most cases; the only patient that presented rigidity impairment had corporal tissue fibrosis, as a consequence of a failure in the treatment of a priapistic episode.⁸

Penile girth increase was present in both flaccidity and erection, in the reports of post-priapistic cases that provided adequate clinical details,^{4,5,7,8} while in idiopathic cases,^{1,2} including ours, it only occurred in erection.

In the literature retrieved cases of corporal dilatation the aneurysmatic enlargement is reported symmetrical in the 2 corpora, either by explicit description of the case,^{1,2} or by the imaging provided in the reports,^{4,5,7} or even by intraoperative description.⁸ In 1 report only⁶ there is no mention of either symmetry or asymmetry, “megalo-penis” being the only term used.

In most cases, the intercourse was only partially, or not mechanically possible due to the developed penile girth increase, with associated partner dyspareunia; the reported maximal girth measurements ranged from 16 to 25 cm.

All cases that underwent surgery were treated by a reduction corporoplasty. In the idiopathic cases,^{1,2} including ours, there was a consistent finding of a thinned albuginea in the affected area. The case with associated erectile dysfunction received also a penile prosthesis; albuginea rupture developed in the suture line at the device activation and required a “free tunica albuginea flap graft.”⁸ Reported follow-ups are limited, not exceeding 6 months.

Acquired penile widening appears a spectrum disease: in post-priapistic cases it is present both in flaccidity and in erection; conversely, in idiopathic cases it can be appreciated in erection only, and at surgery there is a consistent finding of thinned albuginea,^{1,2} as also in our case.

The scattered cases published in the last 40 years have been reported with different names, as mentioned earlier. We hypothesize that the lack of a unifying term might have contributed to an under-reporting of this condition. We therefore propose to name this syndrome as “circumferential acquired macropenis.” “Circumferential” as opposed to longitudinal, “acquired” as opposed to congenital, “macropenis” as opposite to micropenis. Such term encompasses 2 distinct etiologies: post-priapistic cases in a substrate of sickle cell disease, characterized by penile girth increase both in flaccidity and erection, and idiopathic cases, characterized by girth increase in erection only, and at surgery by a thinned albuginea in the affected area.

What should the maximal penile girth in erection be considered? Two studies provide valuable data. A systematic review, evaluating 20 studies with up to 15,521 men, elaborated nomograms for different penile size measurements: the value of erect girth dimensions at the 95th percentile resulted of 13,5 cm.¹⁰ Another recent study investigated the maximal upper limit for

girth compatible with penetrative intercourse, based on measurements of both best-selling realistic dildos and published erect penile dimensions. The study concluded that a maximal final girth of 15.1 cm should not be exceeded, as a wider girth could be associated with an inability to engage in penetrative intercourse and/or result in pain for the patient’s partner.¹¹

Among the cases we retrieved, along with our case, those associated with impossibility of normal penetration and/or dyspareunia^{2,4,6,7,9} have all a maximal penile girth at erection that exceeds the above values, ranging from 16 to 25 cm. This consideration further supports our definition of “circumferential acquired macropenis” syndrome, as the development over time of a penile girth enhancement that mechanically hampers penetration.

2 are the main limitations of our study. Firstly, there is a limited number of cases of acquired penile girth increase reported in medical literature. Secondly, our proposed geometric surgical approach is limited to 1 single case, although now with a significant follow-up, that exceeds by 3 times the longest follow-up reported for this condition.

CONCLUSIONS

Circumferential acquired macropenis is an unusual but defined medical entity that prevents affected men from effective sexual penetration. This condition, although without a unique etiology, can nonetheless be effectively surgically treated; we assume that the adoption of our proposed unifying definition will help its easier identification in the future.

We have devised a simple geometrical approach to perform a sound correction of bilateral aneurysmal dilatation of both corpora, which we hope will be helpful in treating similar cases.

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Luciano Macropodio, Civil Engineer, Italy, gave valuable advices in the mathematical formulation of our geometrically-based calculation.

Alberto Strano, Computer Graphic designer, Italy, created the image of [Figure 4](#).

CONSENT TO PARTICIPATE

Our patient consented in writing for the use of his clinical material for scientific purposes.

Corresponding Author: Edoardo Stefano Pescatori, MD, Andrology Service, Hesperia Hospital, Via Sirena 22/B, loc. Bazzano, Valsamoggia (BO) 40053, Italy. Tel: +39 3479024055; E-mail: info@andrologiapescatori.it

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STATEMENT OF AUTHORSHIP

Edoardo Stefano Pescatori performed the literature review, conceived and performed the surgical strategy, wrote the manuscript. Barbara Drei cooperated with surgery, with literature search, reviewed and edited the manuscript. Salvatore Rabito was responsible for all images capturing and editing, helped with literature search, reviewed and edited the manuscript.

REFERENCES

1. Watson DL, Morgentaler A. Spontaneous corporeal herniation of the penis: a new abnormality of the tunica albuginea? *J Urol* 1995;153:737–740.
2. Dockray J. Reduction corporoplasty for aneurysmal corporal dilatation. Is it safe or feasible? *J Sex Med* 2016;13 S150 P-01-027.
3. Moncada I, Krishnappa P, Romero J, et al. Penile traction therapy with the new device 'Penimaster PRO' is effective and safe in the stable phase of Peyronie's disease: a controlled multi-centre study. *BJU Int* 2019;123:694–702.
4. Datta NS. Megalophallus in sickle cell disease. *J Urol* 1977;117:672–673.
5. Kassim AA, Umans H, Nagel RL, et al. Megalophallus as a sequela of priapism in sickle cell anemia: use of blood oxygen level-dependent magnetic resonance imaging. *Urology* 2000;56:509.
6. Rourke KF, Fischler AH, Jordan GH. Treatment of recurrent idiopathic priapism with oral baclofen. *J Urol* 2002;168:2552.
7. Martinez DR, Manimala NJ, Rafiei A, et al. The reduction corporoplasty: The answer to the improbable urologic question "Can you make my penis smaller?". *J Sex Med* 2015;12:835–839.
8. Kattan S, Seyam RM, Al-Ghamdi D. Reduction phalloplasty and penile prosthesis implantation in a case of megalophallus as a consequence of neglected priapism. *J Sex Med* 2004;1 (s1) 142-142.
9. Rosen R, Riley A, Wagner G, et al. The International Index of Erectile Function (IIEF): a multidimensional scale for assessment of erectile dysfunction. *Urology* 1997;49:822–830.
10. Veale D, Miles S, Bramley S, et al. Am I normal? A systematic review and construction of nomograms for flaccid and erect penis length and circumference in up to 15,521 men. *BJU Int* 2015;115:978–986.
11. Isaacson D, Aghili R, Wongwittavas N, et al. How big is too big? The girth of bestselling insertive sex toys to guide maximal neophallus dimensions. *J Sex Med* 2017;14:1455–1461.