



Case Series

Use of neocords in the treatment of mitral valve prolapse: about 6 cases



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ABSTRACT

INTRODUCTION AND IMPORTANCE: Mitral insufficiency is a common valve disease with a prevalence of 2% and increases after the age of 65. This is the second valvulopathy operated after aortic stenosis.

The surgical management of mitral insufficiency has been completely changed in recent years. The mitral valvular replacement with was the gold standard; is currently preceded by conservative surgery thanks to the emergence of reproducible and durable surgical techniques.

The aim of our study is to highlight the place of Neogortex in the treatment of mitral valvular prolapse. **METHODS:** This is a retrospective study that includes 6 adult patients operated on for mitral insufficiency by prolapse of the large valve between October 2016 and June 2018 in the Cardiovascular Surgery Department A of the Ibn Sina Hospital in Rabat, Morocco.

RESULTS: We collected 6 patients. The average age is 56 years. The clinical presentation was made of dyspnea in the 6 patients. On the echocardiographic level, all patients had mitral insufficiency due to prolapse of the large mitral valve in 2 patients and a restriction of the play of the valve by shortening of the ropes in 2 patients. The 6 patients were operated. The technique was the installation of a prosthetic ring with neogortex fixation between the free edge and the abutment and a tricuspid plasty type Devega. The operative sequences were simple.

CONCLUSION: Mitral valve repair gives satisfactory results in terms of survival and symptomatic improvement with a low operative risk.

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1. Background

Conservative surgery for mitral insufficiency commonly known as mitral plasty, remains a complex surgery whose results depend on the diagnostic expertise and that of the surgeon.

However, a better understanding of the mechanisms of mitral efficiency allows us to propose mitral reconstructive techniques that are more and more reproducible with lasting results.

The use of neo-cordae in the conservative treatment of prolapsed is an additional guarantee in the obligation of lasting results.

The purpose of our article is to highlight the place of neocordae in conservative surgery for mitral regurgitation, especially in complex situations.

2. Patients and methods

This is a retrospective study which includes 6 adult patients operated for mitral insufficiency with mitral valve prolapsed between October 2016 and June 2018 in the cardiovascular surgery department A of Ibn Sina hospital.

Clinical, echocardiographic, therapeutic and evolutionary data were collected.

We collected 6 patients. The average age is 56 years (40–72 years). The sex-ratio M/F was 4/2. All the patients were operated.

The approach was vertical median sternotomy. Cardiopulmonary bypass was conducted in moderate hypothermia, between an aortic cannula at the foot of the brachiocephalic arterial trunk and two venous cannulas as well as a left ventricular

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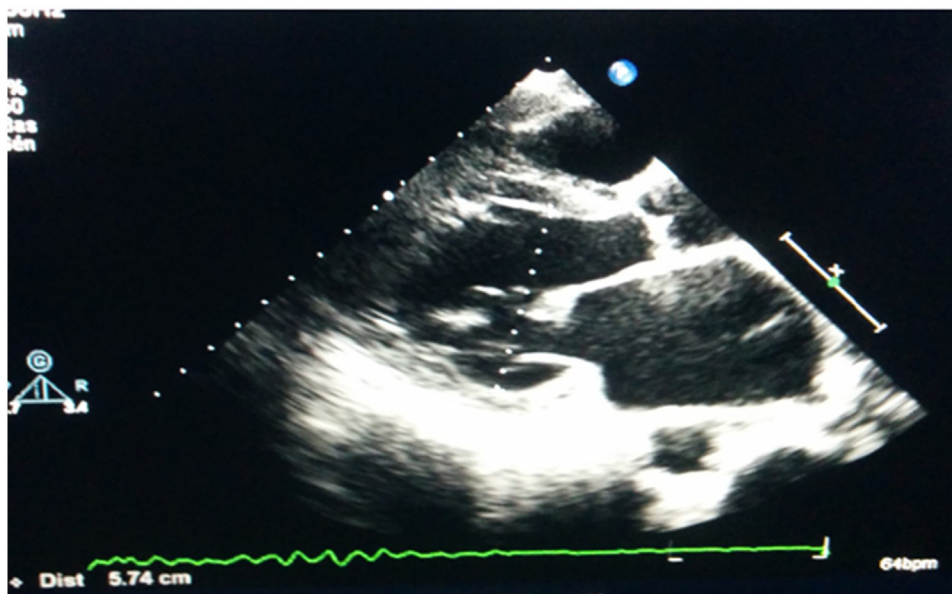


Fig. 1. Echocardiography performed in one of our patients showing an anterior prolapse, Carpentier type II.

Table 1
Summary of patients showing the mechanisms of mitral insufficiency with the corrections made.

	Dyspnoea	Lesions	Dysfunction	Actions
Patient 1	III	Prolaps A2, A3 by chordae rupture	IM type II	Shortening of secondary chordae A2, A3 with prosthetic annulus
Patient 2	IV	Restriction of valve clearance A1, A2 by shortening the chords at the AL pillar.	IM type III	Resection of chords adjoining the AL pillar. Placement of neogortex at the level of the AL abutment and the free edge of A1, A2
Patient 3	IV	Prolapse of segment A3 of the anterior valve by rupture of the cord	IM type II	Triangular resection of the portion of segment A3 adjacent to the ruptured cord. Installation of a new cordae from the apex of the PM pillar to the free edge of segment A3.
Patient 4	IV	A2, A3 cordaes shortening	IM type III	Resection of the lower head of the MP pillar and placement of a neogortex at this level and adjoining segment P3.
Patient 5	III	Prolapse A2, A3 by cordae break	IM type II	Secondary cord resection, prosthetic annulus, and neo-cordae between the free edge and the pilar A2
Patient 6	III	Loss of substance between P2 and P3 by chronic vegetation with A2 prolapse	IM type II	Mitral prosthetic annulus, suture between P2 and P3, placement of neocordae between the free edge and the A2 pilar

discharge cannula via the right upper pulmonary vein. Myocardial protection was provided by blood cardioplegia.

This study of case series was carried out in accordance with the PROCESS GUIDELINES [1].

3. Results

The clinical presentation was made of dyspnea stage III-IV according to N.Y.H.A classification in the 6 patients (Table 1). Echocardiographically, this was all mitral insufficiency due to mitral valve prolapsed in 4 patients and restriction of valve clearance by shortening the cordae in 2 patients. Ostium secundum type inter-auricular communication was present in one patient (Fig. 1).

Therapeutically, the 6 patients were operated. The surgical technique consisted of a mitral plasty in all patients. They underwent a mitral annuloplasty using a prosthetic annulus.

A transfer of cordae was performed in one patient, a shortening of cordae was performed in one patient and neo-cordae fixation was performed in the 6 patients (Table 1).

Tricuspid insufficiency of functional origin was corrected by Devega plasty in 3 patients and by a prosthetic annulus in two patients. Verification with immediate pear test showed good coaptation of the valve leaflets.

The immediate postoperative follow-up was simple with zero mortality. During the hospital stay, the results of the mitral plasty were judged satisfactory on cardiac ultrasound showing minimal mitral insufficiency in all patients.

During follow-up, we actively monitored all patients. Clinically, we have seen an improvement in dyspnea. Echocardiographic checks at one month and at 6 months showed a non-leaking mitral plasty with minimal mitral insufficiency.

4. Discussion

Mitral insufficiency is a valvulopathy which brings together several etiologies whose pathophysiological mechanisms and anatomical lesions responsible for regurgitation are different. This diversity explains the variety of surgical treatments offered. The development of conservative techniques is due to Carpentier's work.

The different valve reconstruction techniques are based on the precise knowledge of the mechanisms of mitral insufficiency which are highlighted by ultrasound functional analysis of the mitral valve.

This functional analysis is based on the Carpentier's classification based on the nature of valvular movements and which responds to 3 types of mechanisms, and whose objective is to

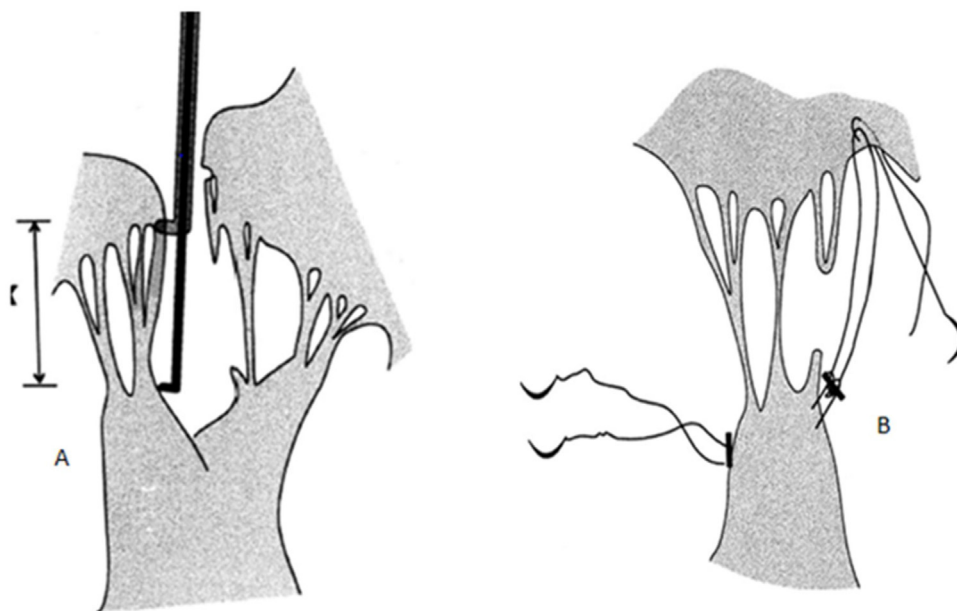


Fig. 2. images taken from literature [3].

A- Measure the correct length of the neo-chords.

B- After attaching the pre-measured Goretex to the papillary muscle, the free elements are sutured onto the respective segments of the valve.

Table 2

Table taken from the literature illustrating Carpentier's classification of mitral insufficiency [1].

Carpentier's functional classification	
Type I	Normal leaflet motion
Type II	Excess leaflet motion (leaflet prolapse)
Type III	Restricted leaflet motion
IIIa	Restricted opening
IIIb	Restricted closure

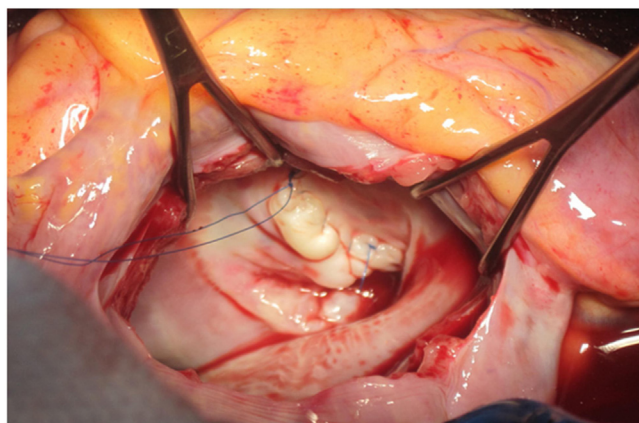


Fig. 4. Operative view of one of the patients showing the placement of Gore-Tex.

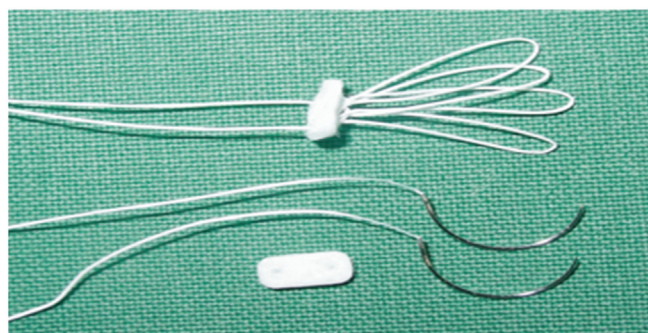


Fig. 3. Image taken from literature showing a pre-measured Gore-Tex [4].

restore the ratio between the anterolateral diameter and the transvers diameter of the mitral annulus at a ratio of $1/3$ (Table 2) [2].

Many techniques exist to correct an anterior valve prolapsed. The most used is the transposition of chordae which corresponds to a transfer of healthy chordae from the posterior valve to the anterior valve. This technique is reliable and easily reproducible; it gives excellent long-term results [3].

The other most commonly used technique is the use of artificial chordae (Goretex®) which are fixed between the abutment and the free edge of the valve (Figs. 2–4).

In case of elongation of chordae, the techniques of shortening of chordae can be used by burial in the pillar or by sliding of the mitral pillar [4].

Chronic mitral insufficiency, regardless of the etiology, is often accompanied by annular dilation. The dilation often predominates on the posterior portion of the mitral annulus.

In conservative surgery, performing an annuloplasty corrects annular dilation and restores the anatomy of the mitral annulus [5,6] (Fig. 5).

Mitral surgery is most often isolated but it may be accompanied by aortic or tricuspid valve surgery, especially in rheumatic pathologies.

Tricuspid insufficiency, often of functional origin, accompanies severe mitral insufficiency. It must be corrected if it is significant and accompanied by pulmonary arterial hypertension.

5. Conclusion

Mitral insufficiency is defined by a loss of the tightness of the mitral valve, complex by its mechanisms, its etiologies and its evolutionary aspects.

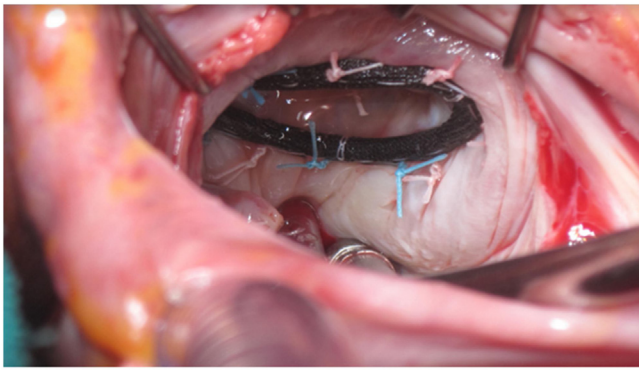


Fig. 5. Operative view of one of the patients showing the placement of the mitral prosthetic annulus.

Correction techniques for anterior valve prolapse using artificial chordae (Goretex) provide reliable and reproducible results.

What is already known on this topic?

- Mitral insufficiency is a valvulopathy which bring together several etiologies
- This functional analysis is based on the Carpentier's classification.
- In conservative surgery, performing an annuloplasty corrects annular dilation and restores the anatomy of the mitral annulus.

What this study adds

- The aim of our study is to highlight the place of Neogortex in the treatment of mitral valvular prolapse.
- Echocardiographic checks at one month and at 6 months showed a non-leaking mitral plasty with minimal mitral insufficiency.
- Transposition of chordae technique.

Declaration of Competing Interest

The authors report no declarations of interest.

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Ethical approval

The policy of our service means that a written consent in Arabic is signed by all patients who need to benefit from open-heart surgery including the explained risks of surgery as well as a possible scientific publication respecting international ethical rules.

*if necessary I send you a writing consent according to IJS publishing group Ltd.

Consent

Ethical rules on respect for human rights regarding scientific publications have been respected.

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Author contribution

All authors have read and approved the manuscript.

HW: main author managed the patients.

HB: co-author analyzed the patient data and was a major contributor in writing the manuscript.

BB: helped drafting the work.

JR and RS: cardiovascular surgeons (professors) who participated to consultation meeting; operated the patients and helped in making a final decision of therapy.

ML: supervised the management of the patient, and revised the manuscript

Registration of research studies

Not applicable.

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Availability of data and materials

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

CRediT authorship contribution statement

Hicham Wazaren: Conceptualization, Software, Formal analysis, Investigation, Writing - original draft, Writing - review & editing. **Hanae Bouhdadi:** Formal analysis, Investigation. **Badre El Boussaadani:** Investigation. **Jaafar Rhissassi:** Validation, Visualization. **Rochde Sayah:** Conceptualization, Methodology, Validation, Writing - review & editing, Visualization. **Mohammed Laaroussi:** Methodology, Supervision.

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