

Contractile Properties of the right atrial Myofilaments in Patients with Myxomatous Mitral Valve Degeneration

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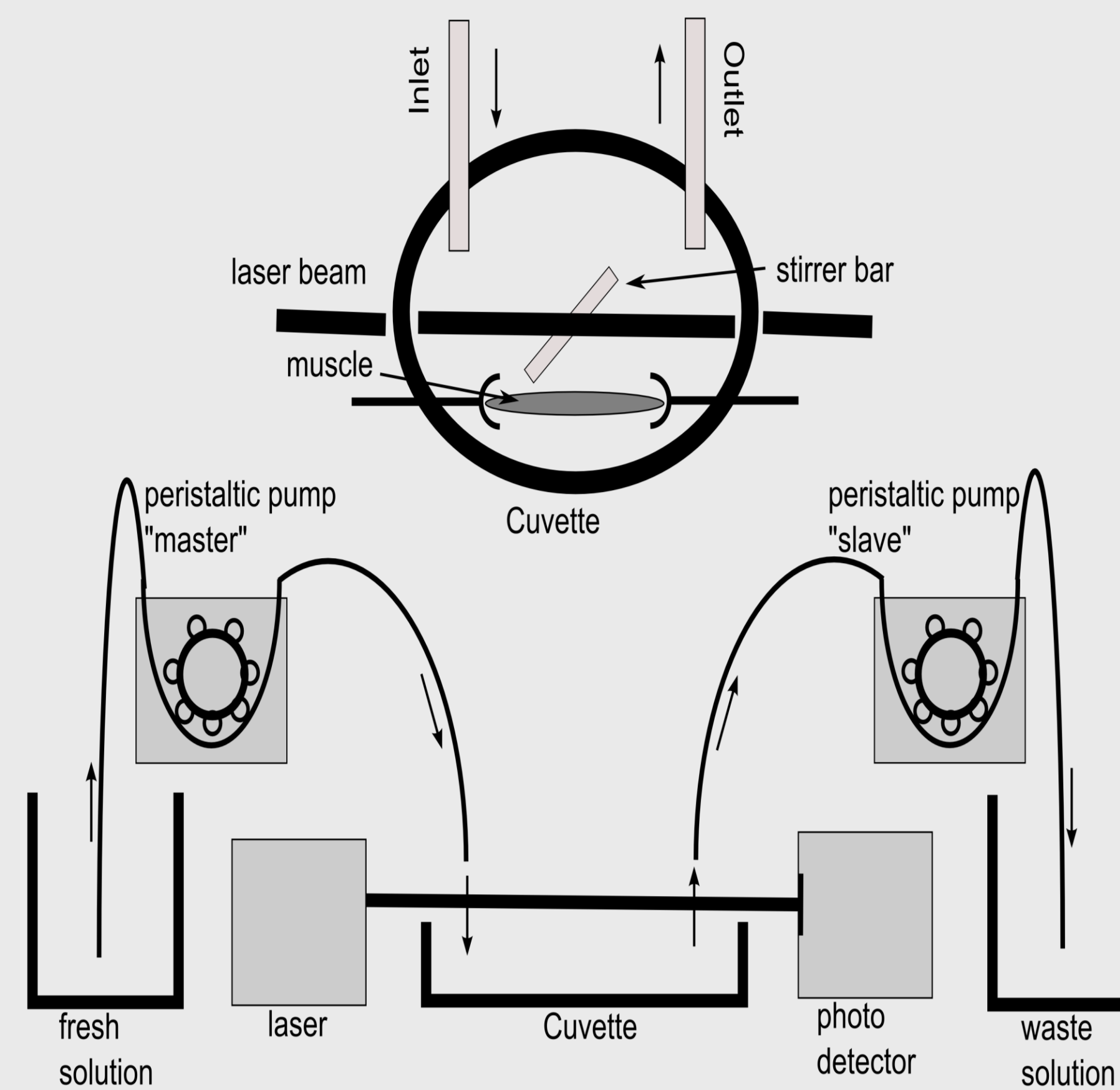
Objective

Myxomatous degeneration of the mitral valve is a common pathological finding in mitral valve surgery and the most common reason for severe mitral valve regurgitation. Considering the importance of right ventricular remodeling and function after mitral valve surgery we tried to elucidate a possible association of myxomatous mitral valve and impairment of right atrial and ventricular function which might have an impact on global ventricular performance after mitral valve surgery.

Methods

Right atrial tissue was harvested from 47 patients undergoing mitral valve surgery. We took the trabeculae from the right auricle, which was resected at the right auricle for implementation of extracorporeal circulation. The tissue was skinned and prepared in a 24h lasting procedure to create small fibers for hinging them in the "muscle machine", an experimental set-up, created for pCa-force measurements. The results were analyzed statistically and compared using Wilcoxon rang sum test.

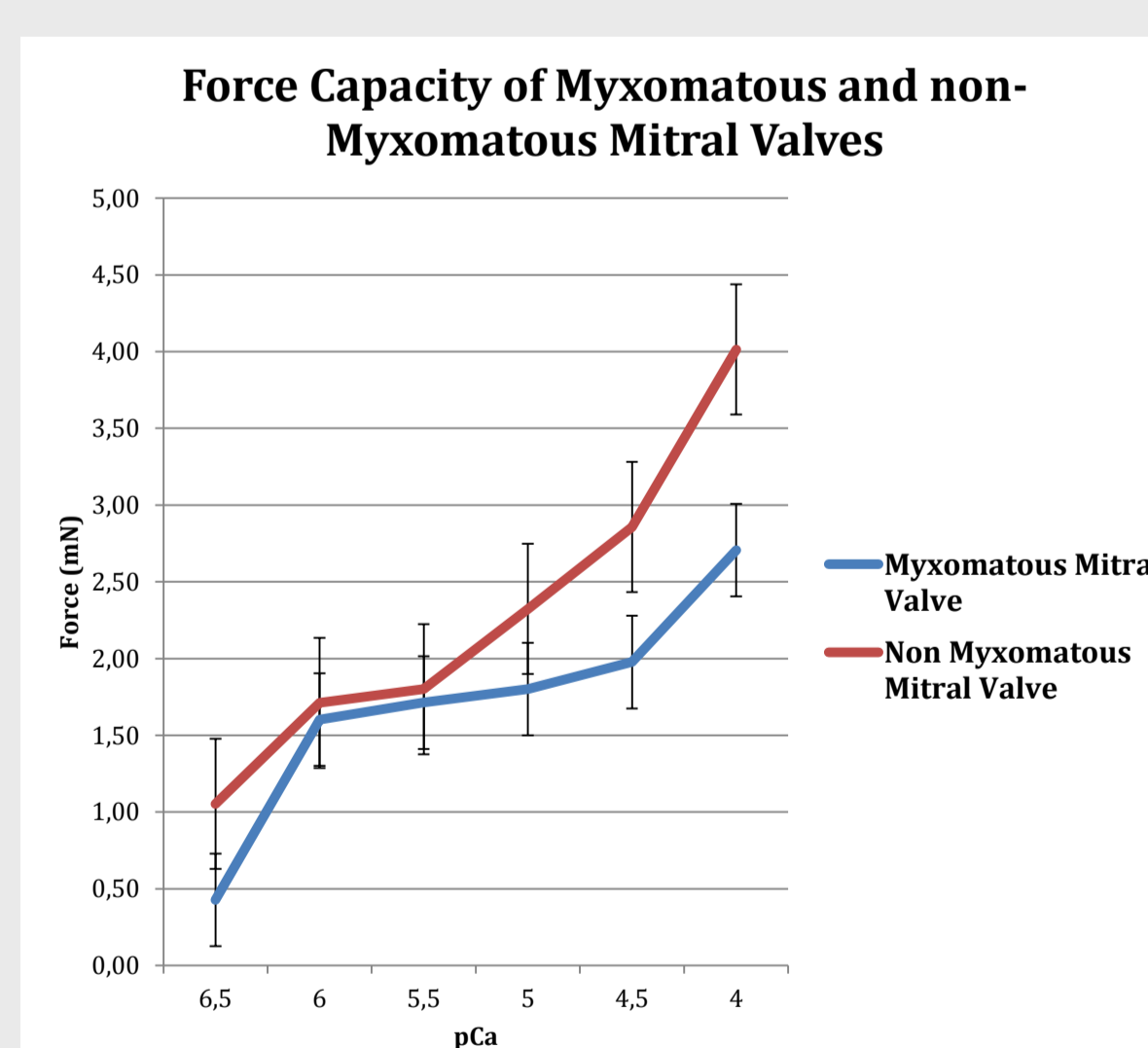
Experimental setup of the „Muscle Investigation System“:



One pump („Master pump“) transports a certain amount of solution containing calcium into the cuvette and the „slave“ pump withdraws the same amount. By increasing the calcium concentration the fiber starts the contraction and the force can be recorded.

Results

Patients without myxomatous mitral valve develop significant more force ($4.0 \text{ mN} \pm 0.8 \text{ mN}$) at the highest step of calcium concentration compared to $2.7 \text{ mN} \pm 0.4 \text{ mN}$ in group of patients with myxomatous valve degeneration ($p 0.03$). Calcium sensitivity in the myxomatous valve group was at pCa 6.0 and in the non-myxomatous group at pCa 5. Furthermore we observe a significant difference in ejection fraction (EF) among the groups: 49% in the non-myxomatous group versus 57% in the myxomatous group ($p 0.03$). In the non-myxomatous group 5 patients had diastolic dysfunction grade I-II (22,7%), this was also significant ($p 0.04$)



	Myxomatous Mitral Valve	Non Myxomatous Mitral Valve	P
Age	60 ± 16 years	67 ± 13 years	n.s.
Male Gender	52%	36%	n.s.
Female Gender	48%	63%	n.s.
Valve Regurgitation	64%	90%	n.s.
Valve Stenosis	36%	10%	n.s.
Valve Repair	48%	72.7%	0.02
Valve Replacement	52%	36.3%	
Ejection Fraction	57%	49%	0.03
Atrial Dilat.	36%	68%	0.01
Ventricular Dilat.	12%	13%	n.s.
Annulus Dilat.	4%	9%	n.s.
Atrial Fibrillation	24%	38%	n.s.
Valve Prolapse	36%	27%	0.02
Diastolic Dysf.	40 %	22.7%	0.04

Conclusion

Patients with myxomatous mitral valve degeneration seem to have reduced force capacities. Calcium sensitivity is higher compared to the non-myxomatous group, which might be a compensatory mechanism to cover the physiological demand. Furthermore we suggest a higher incidence of diastolic dysfunction in patients with myxomatous mitral valve degeneration, which might have an impact on ventricular remodeling after mitral valve surgery.

