

# Mitral Perivalvular Leak after Blunt Chest Trauma:

## A Rare Cause of Severe Subacute Mitral Regurgitation

Nicola Marchese, MD  
Antonio Facciorusso, MD  
Carlo Vigna, MD

*Blunt chest trauma is a very rare cause of valve disorder. Moreover, mitral valve involvement is less frequent than is aortic or tricuspid valve involvement, and the clinical course is usually acute. In the present report, we describe the case of a 49-year-old man with a perivalvular mitral injury that became clinically manifest one year after a violent, nonpenetrating chest injury.*

*This case is atypical in regard to the valve involved (isolated mitral damage), the injury type (perivalvular leak in the absence of subvalvular abnormalities), and the clinical course (interval of one year between trauma and symptoms). (Tex Heart Inst J 2015;42(6):579-81)*

**H**eat valve damage secondary to blunt trauma is rare, but it often can be acutely symptomatic. The aortic and tricuspid valves are most often involved, because of their retrosternal positions. We report the case of a man who presented with pulmonary edema and severe mitral perivalvular regurgitation as a consequence of blunt chest trauma during the previous year.

### Case Report

A 49-year-old man, with no history of cardiac disease, presented with progressive dyspnea of one month's duration.

*Medical History.* His medical history included blunt chest trauma, the result of an accidental fall from scaffolding 15 months earlier. He had fallen approximately 8 feet and had landed on the right side of his back and on his right shoulder. The patient had sustained bilateral pneumothorax, right iliopsoas muscle hematoma, multiple right costal fractures, fracture of the L3 vertebral body and the transverse process, and displaced fractures of the right clavicle. That hospitalization had lasted 40 days, during which time the clinicians had not detected any murmur or requested a cardiac evaluation. The patient returned to normal activities 4 weeks after discharge from the hospital and remained asymptomatic for one year.

Upon his arrival at our department, auscultation revealed bibasilar rales and a pansystolic murmur. Chest radiography showed mild lung congestion; and transthoracic echocardiography, limited by suboptimal acoustic windows, revealed severe, eccentric mitral regurgitation. The valvular and subvalvular apparatus appeared to be structurally normal, and the left atrium was only mildly dilated. The patient was treated with intravenous diuretics until the signs and symptoms of congestion were relieved. Coronary angiography revealed an absence of substantial coronary disease. We therefore planned an elective surgical procedure for mitral valve repair.

*Surgical Procedure.* During intraoperative transesophageal echocardiography (TEE), we observed both a trivial central mitral regurgitant jet and a severe perivalvular regurgitant jet, this last originating from a ventriculoatrial fistulous communication behind the P1 scallop (Fig. 1). Further examination confirmed the absence of structural disease involving the mitral leaflets or subvalvular apparatus. After surgical exposure of the mitral valve, a small tear (length, 6–7 mm) could be seen behind the posterior leaflet, in a lateral position, involving also the annulus and the left atrial wall. The absence of leaflet abnormalities or vegetations suggested the posttraumatic origin of the perivalvular leak. Valvular repair was successfully achieved by direct suture of the tear with three 5-0 Prolene stitches and by the subsequent insertion of a 30-mm mitral annuloplasty ring. The patient was extubated the next day and his postsurgical course was uncomplicated. One year later, he was asymptomatic, and his one-year follow-up

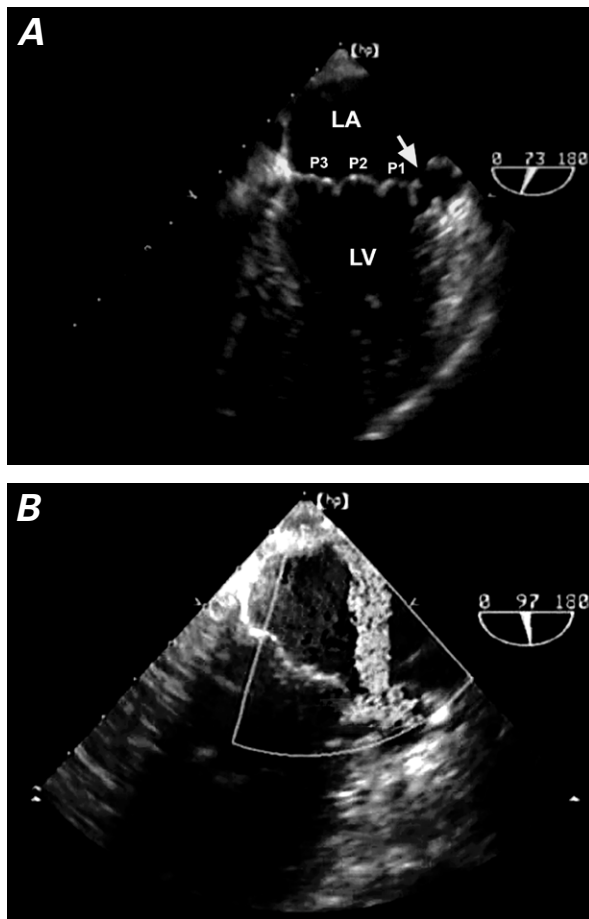
**Key words:** Accidental falls; blunt injury/ultrasonography; chest injury; contusions/diagnosis/therapy; echocardiography, transesophageal; fistula/complications/ultrasonography; mitral valve/injuries/surgery; mitral valve regurgitation/ultrasonography; wounds, nonpenetrating/complications

**From:** Department of Cardiology, Casa Sollievo della Sofferenza Hospital IRCCS, 71013 San Giovanni Rotondo, Italy

**Address for reprints:** Nicola Marchese, MD, Department of Cardiology, Casa Sollievo della Sofferenza Hospital IRCCS, Viale Cappuccini, 71013 San Giovanni Rotondo (FG), Italy

**E-mail:** nicmarchese@gmail.com

© 2015 by the Texas Heart<sup>®</sup> Institute, Houston



**Fig. 1** Transesophageal echocardiography of the mitral perivalvular leak after nonpenetrating chest trauma shows **A)** a ventriculoatrial fistulous communication (arrow) behind the P1 scallop, and the absence of structural disease involving the mitral leaflets or the subvalvular apparatus; and **B)** the eccentric regurgitation jet directed away from the fistulous communication.

LA = left atrium; LV = left ventricle

transthoracic echocardiogram confirmed the excellent result of his surgical treatment.

## Discussion

Heart valve disorder is a very rare sequela of blunt chest trauma.<sup>1</sup> The probable pathophysiologic mechanism is a rapid increase in pressure during vulnerable phases of the cardiac cycle (that is, late diastole and early systole). In the case of posttraumatic valve disorder, the tricuspid and aortic valves are often involved<sup>2</sup> because of their retrosternal position, but several case reports have described mitral injury.<sup>3,4</sup> Rupture of papillary muscle or chordae tendineae is the most frequently reported mitral disorder after blunt chest trauma.<sup>4</sup> Its clinical presentation can vary widely, depending on the type or extension of damage, on regurgitation severity, and on ventricular function; the clinical course is usu-

ally acute.<sup>3,5</sup> Mitral valve injury after blunt trauma can take the form of rupture of leaflets, papillary muscles, or chordae tendineae (particularly those supplying the posterior leaflet). Another possible mechanism (other than an increase in pressure) is the ischemic injury of papillary muscle caused by edema, hemorrhagic infiltrates, or vascular damage, and followed by progressive elongation and rupture.<sup>4</sup> Papillary muscle damage is often characterized by an acute clinical course, caused by severe regurgitation.

The present case is highly atypical in regard to the valve involved (isolated mitral damage), the injury type (perivalvular leak in the absence of subvalvular abnormalities), and the clinical course (the interval of one year between trauma and symptoms). A violent thoracic compression might have caused annular damage and subsequent dehiscence, thereby promoting the development of a perivalvular fistulous communication between the left ventricle and the left atrium. The prolonged interval between trauma and symptoms suggests a progressively enlarging leak and consequent worsening of perivalvular regurgitation.

Two similar cases of posttraumatic mitral perivalvular leak are present in the literature.<sup>6,7</sup> Despite obvious differences in location and extent of mitral damage, both share at least 2 characteristics with the present case: the long interval between the trauma and the symptoms, and the surgical approach to mitral valve repair.

Transthoracic echocardiography and TEE are the preferred diagnostic tools in cases of suspected cardiac involvement after blunt chest trauma. In our patient, TEE accurately identified the exact mechanism of the disorder and guided the surgical repair.

Treatments include medical therapy and valve replacement or repair,<sup>4</sup> depending on the location and type of defect, the extent of the damage, and the surgeon's expertise. In our patient, the defect was successfully repaired by direct suture and (because of concomitant annular involvement) the insertion of a mitral annuloplasty ring.

## References

1. Sybrandy KC, Cramer MJ, Burgersdijk C. Diagnosing cardiac contusion: old wisdom and new insights. *Heart* 2003;89(5):485-9.
2. Ismailov RM, Weiss HB, Ness RB, Lawrence BA, Miller TR. Blunt cardiac injury associated with cardiac valve insufficiency: trauma links to chronic disease? *Injury* 2005;36(9):1022-8.
3. Farmery AD, Chambers PH, Banning AP. Delayed rupture of the mitral valve complicating blunt chest trauma. *J Accid Emerg Med* 1998;15(6):422-3.
4. Kumagai H, Hamanaka Y, Hirai S, Mitsui N, Kobayashi T. Mitral valve plasty for mitral regurgitation after blunt chest trauma. *Ann Thorac Cardiovasc Surg* 2001;7(3):175-9.
5. Bailey PL, Peragallo R, Karwande SV, Lapunzina P. Mitral and tricuspid valve rupture after moderate blunt chest trauma. *Ann Thorac Surg* 2000;69(2):616-8.

6. Devarapalli S, Segar DS. Chronic mitral regurgitation secondary to a perivalvular leak from remote trauma. *J Am Soc Echocardiogr* 2003;16(10):1082-4.
7. Sahebjam M, Marzban M, Soleimani A, Zoroufian A. A rare cause of chronic mitral regurgitation: perivalvular ventriculoatrial fistulous communication from remote blunt chest trauma. *J Am Soc Echocardiogr* 2007;20(12):1416.e3-5.