Transventricular Mitral Commissurolysis
or Commissurotomy by Finger*
(In Atrial Thrombosis or Recurrent Stenosis)

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The difficulties and risks involved in the auricular approach to the stenotic mitral valve in presence of thrombosis of the auricular appendage and atrium are well known. Embolism is a serious hazard. Out of a total of 3,978 cases operated on our center until 1960, 724 had thrombosis of the auricular appendage or atrium of which 191 had embolism, involving a total of 90 deaths.

A further serious difficulty in commissurotomy by the auricular route may be the presence of a small, retracted auricular appendage verifiable only at operation. This was the case in 479 of the above 3,978 patients.

Similar problems can arise in recurrent stenosis; often the auricular stump is small and can no longer be used as a route of access to the valve.

In all such cases, we have been using the transventricular approach for the last three years. The index finger is inserted into the ventricle in order to detect the state of the mitral valve and to widen the stenotic orifice. This was one of the first techniques used by Cutler* in the surgical treatment of mitral valve disease since 1924.

Subsequently, however, the auricular route was preferred, being more accessible and practicable. Thousands of patients have been operated on by this method.

In 1959, Logan and Turner proposed a bimanual technique involving the insertion of a valvular dilator through the ventricular wall and the index finger through the auricular appendage.

This technique, employed by many authors however, involved the same difficulties as are encountered in cases of small, absent or thrombosed auricular appendage.

No reference could be found in the literature about the performance of the digital transventricular technique beside the ones performed by Cutler.*

This has been employed in a personal series of 72 patients. The object of the present paper is to present the results and to draw attention to the advantages and indications of the method.

Technique

With the patient supine, left anterior thoracotomy is done. After opening the pericardium, the usual examination is made; the finding of a diastolic thrill on the left ventricle confirms the presence of mitral stenosis.

The posterior wall of the left atrium is palpated in order to detect whether or not there is a systolic thrill, which would indicate associated mitral insufficiency, account being taken of size, site and consistency (palpation must be very gently done in order to avoid mobilizing any fresh thrombi which the left auricular appendage may contain). Palpation of the atrial wall, by providing information about its consistency and resistance to pressure, will enable the deposition of any thrombi in the interior to be detected.

Moreover, we routinely use to record before and after commissurotomy the left atrial tracings which show high "c" waves when insufficiency is present.

If surgical access to the valve through the auricular appendage or lateral wall of the atrium is found to be impracticable or too hazardous, the ventricular approach is chosen.

*From the Department of Cardiac Surgery, University of Turin (Head: Prof. A. M. Dogliotti).
A purse-string or wide "U" suture is made with a No 0 atraumatic needle on the anterior wall of the left ventricle, in an area in which there are no large coronary vessels (about 2-3 cm. from the apex). Standing on the right-hand side of the patient, the surgeon makes a ventriculotomy incision. Through this incision, which is progressively dilated, the index finger of the right hand (suitably gloved and lubricated with sterile paraffin oil) is introduced. A rotatory movement may facilitate penetration of the finger.

Because of fusion and retraction of the chordae tendineae together with a tight mitral stenosis, it is nearly always difficult to find the mitral orifice. For this reason it may be useful to locate the blood jet reaching the ventricle during diastole and trace it against the current to its outlet at the valve. In this way, the valve orifice can be traced and identified by the disappearance of the thrill once the finger has been inserted. After the presence and extent of the stenosis and the location of the commissures have been verified, it is possible to carry out a satisfactory commissure "splitting" procedure as far as the annulus fibrosus.

By simple digital divulsion, it is generally possible to widen the orifice to 3.5-4 cm. Both commissures can be easily approached, especially the posteromedial commissure (which is difficult to "split" through the auricular appendage).

By means of a suitable maneuver the chordae tendineae and the papillary muscles are separated, since their fusion beneath the orifice tends to create and maintain the stenosis. This separation of the adhesions of the chordae tendineae and papillary muscles is much easier by the ventricular route and is of considerable practical importance, since it ensures satisfactory mobility of the valve leaflets and prevents a recurrence of the stenosis.

In cases in which the fibrosclerotic commissures resist divulsion, the index finger is fitted with a Dogliotti ring valvulotome and an incision is made on one or both commissures, divulsion and "splitting."

During the various maneuvers, the fingers of the left hand should rest on the posterior atrial wall in order to detect any possible systolic thrill due to valvular insufficiency, in which case extreme care should be used or the widening maneuver suspended.

On completion of the operation, the ventricular slit is closed by tying the "U" suture and making several additional sutures. A drainage tube is left in the pleural cavity and the wall sutured.

**Case Reports**

The digital technique by ventricular approach has been employed in 72 cases, 34 women and 38 men, aged between 23 and 52 years.

The ventricular route, was chosen during operation: (a) in 52 cases, because of thrombosis of the auricular appendage,

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**Table 1—Mitral Stenosis**

<table>
<thead>
<tr>
<th>Operative Embolization</th>
<th>Atrio-ventricular</th>
<th>Transatrial</th>
<th>Transventricular</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach</td>
<td>26.4%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Deaths</td>
<td>Damage (in 52 cases)</td>
<td>47%</td>
<td>12.5%</td>
</tr>
</tbody>
</table>

**Figure 1**
(b) in nine cases, because of absence or small size of auricular appendage, (c) in 11 cases of reoperation due to inaccessibility of the remaining auricular stump.

In all cases, stenosis was very tight (from 0.3 cm.\textsuperscript{2} to 0.6 cm.\textsuperscript{2}) and widening was satisfactorily achieved to 3-4 cm.\textsuperscript{2}.

In only two cases did slight insufficiency arise. This was proved by detection of the thrill palpated on the posterior wall of the left atrium after commissurotomy and by appearance of high "c" waves on the left atrial tracing.

In 58 cases widening was achieved by simple digital divulsion; in two cases with the aid of a two-pronged divulsor and 12 cases with a Dogliotti ring valvulotome.

No deaths due to operation occurred. In one case laceration of the ventricular wall occurred and was repaired by suitable suturing. In another case ventricular fibrillation arose during massage.

The postoperative course was smooth and uneventful. In only one case, severe hemorrhage occurred. The moderate pleural sero-hemorrhagic effusion in the first three days, which usually follows chest surgery, was drained.

One patient with severe pulmonary artery disease died from cardiorespiratory insufficiency eight days after operation. This was the only death in the series; all cases were followed up between six months and three years after operation.

The results are reported in Table 2.

Recurrence of stenosis was reported in no cases, nor was there complication of ventricular aneurysm in the site of the ventriculotomy.

Patients with fresh atrial thrombi received oral anticoagulant therapy ten days after operation and for several months thereafter.

Five cases displayed electrocardiographic signs of diffuse myocardial damage only in the first few days after operation. Successively multiple ECG exploration revealed no signs of localized ischemia.

**DISCUSSION**

From a study of the case reports and the results of operation, the following conclusions can be drawn:

(A) of the 52 patients with auricular and atrial thrombosis, none had embolism; this is particularly significant if it is remembered that the auricular route is associated with embolism in 26.38 per cent of cases of auriculo-atrial thrombosis (of which 47 per cent culminate in death and 12.5 per cent remain with severe permanent damage). An advantage of digital “splitting” by the ventricular approach lies in the possibility of its immediate application following the detection of an atrial thrombosis; there is no need for widening the left anterior thoracotomy, left lateral thoracotomy or right thoracotomy (as certain workers\textsuperscript{9} suggest), or the use of the extracorporeal circulation\textsuperscript{10},\textsuperscript{11} which would involve postponing the operation to a later date and entail all the postoperative risks of a purely exploratory intervention.

If it is remembered that 18.2 per cent of surgical cases of mitral valve disease present with left auriculo-atrial thrombosis, the practical importance of the suggested approach is more readily appreciated.

(B) The absence or smallness of the left auricular appendage is often associated with thrombosis followed by retraction due to organization of the thrombus in the appendage, which assumes a wrinkled appearance. In such cases, the auricular ap-

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**Table 2—Case Reports**

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<tr>
<th></th>
<th>A.H.A.</th>
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<tbody>
<tr>
<td>Auricular appendage and/or atrial thrombosis</td>
<td>52</td>
</tr>
<tr>
<td>Reoperation</td>
<td>11</td>
</tr>
<tr>
<td>Small or absent auricular appendage</td>
<td>9</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Results according classification</th>
<th>Preoperative</th>
<th>Postoperative</th>
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</thead>
<tbody>
<tr>
<td>0 = 0</td>
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<td></td>
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<tr>
<td>I = 0</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>III = 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Death = 1</td>
<td></td>
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</tbody>
</table>
pendage is often displaced posteriorly due to rotation of the heart and is poorly accessible due to dilatation of the pulmonary artery. This situation is encountered fairly often (in approximately 12 per cent of our cases).

(C) Reoperation in mitral valve disease always gives cause for concern, as well as difficulty in choosing the best route of access to the valve, since the auricular appendage has already been removed. Entry through the atrial wall has been recommended by some, although this is not always possible. Others have suggested entry by the pulmonary vein or by right thoracotomy through the interatrial groove. We believe that the ventricular route is the simplest. After a left anterior thoracotomy is made, the auricular stump, if still utilisable, provides a route of entry to the atrium; if not, the ventricular route is the best alternative.

This technique has an obvious importance, since stenosis is reported to recur in 10 per cent of all cases. The percentage of recurrence in our series is much lower (2-3 per cent), since many of the recurrences reported in the literature are "false recurrent stenoses" due to inadequate widening of the orifice at the first operation.

There can be little doubt that the transventricular digital technique is a valuable method in many cases of repeat operation.

CONCLUDING REMARKS

(1) The method is indicated in cases of auricular thrombosis, of small auricular appendage and in recurrent stenosis with excessively small auricular stump.

(2) The operation can be carried out with a small left anterior thoracotomy involving as little damage as possible.

(3) If the operative plan has envisaged an auricular approach, the ventricular route can be undertaken without altering the thoracotomy incision and without postponing operation to a later date for right thoracotomy or the application of the extracorporeal circulation.

(4) “Splitting” of the postero-medial commissure is easier by the ventricular route than by the atrial route.

(5) The use of the finger is preferable to that of the divulsor, since widening of the orifice can be verified and achieved more accurately.

(6) The suggested technique enables the chordae tendineae and papillary muscles to be more satisfactorily separated.

(7) It is possible to explore with the finger the anatomic condition of aortic valve.

(8) Compared with atrial exploration; the suggested technique provides less accurate assessment of any mitral reflow either prior to or consequent upon widening of the mitral orifice.

Palpation of the posterior wall of the atrium can, however, provide evidence of a systolic thrill due to insufficiency.

Moreover, we routinely record before and after commissurotomy the left atrial tracings which show high "c" waves when insufficiency is present.

(9) Hemostasis is no problem, nor are there any long-term complications, such as ventricular aneurysm at the site of the ventriculotomy.

(10) In auricular thrombosis with a large auricular appendage (in which case the thrombi are always fresh and friable) the ventricular approach avoids the very real risk of embolism.

SUMMARY

Transventricular mitral digital commissure "splitting" is advocated in cases of auricular thrombosis, small auricular appendage and surgery for recurrent stenosis.

Seventy-two cases were treated by surgical intervention, of which 52 had auricular thrombosis, without embolism at operation.

RESUMEN

La separación transventricular digital de la mitral se aconseja en casos de trombosis auricular, orejilla auricular pequeña y en la cirugía por estenosis recurrente.

Se han tratado 72 casos por la intervención quirúrgica de los 52 que tenían trombosis sin embolia al operarse.
La commissurotomie transventriculaire est souhaitable dans les cas avec thrombose de l’auricule, petites dimensions de l’auricule, et en cas de sténose récidivante. Soixante douze cas ont été traités par l’intervention chirurgicale, dont cinquante deux avaient une thrombose de l’auricule sans embolie au moment de l’opération.

Zusammenfassung
Eine transventriculäre digitale Mitralkommissuren Sprengung wird empfohlen in Fällen von aurikulärer Thrombose, engem aurikulärem Zugang und operativem Vorgehen wegen rezidivierender Stenose. 72 Fälle wurden chirurgisch behandelt, von ihnen hatten 52 eine aurikuläre Thrombose, ohne daß es bei der Operation zu einer Embolie kam.

References


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ASBESTOS EXPOSURE

Industrial exposure to asbestos by insulation workers, as studied here, results in a marked increase in the incidence of cancer of the lung, approximately six to seven times the expected incidence. Altogether 45 (17.6 per cent) of 285 men with more than 20 years elapsed since the onset of exposure died of cancer of the lung or pleura. These data do not give the "incidence of cancer of the lung in asbestos." They relate to the specific conditions of our investigation: to a group of men with only intermittent exposure to materials containing limited amounts (often 2 to 20 per cent) of asbestos under working conditions varying from very dusty, as in extracting old insulation in closed quarters, to those with little dust exposure, as in building construction in open air. Moreover, they also relate to the relatively recent past, in a trade with shorter work week of the strong building trades unions, in an era when industry has been aware of potential asbestos hazard and the working population has had some consciousness of potential risk associated with dust exposure.

In three of the 225 deaths among the men who had worked for 20 years or more, the examining pathologist considered the death due to diffuse pleural mesothelioma, and in the two cases in which we have been able to review the histological material, the histologic appearance was that often so categorized, and asbestos bodies were present. This incidence of more than 1 per cent of deaths from pleural mesothelioma is strikingly high for a tumor which is generally considered to be extremely rare.