Intrapericardial Aneurysmal Dilatation of the Left Atrial Appendage

By THOMAS F. GODWIN, M.D., PIERRE AUGER, M.D., JAMES A. KEY, M.D., AND E. DOUGLAS WIGLE, M.D.

SUMMARY
A case of intrapericardial aneurysmal dilatation of the left atrial appendage occurring in a young woman is described. The patient presented with recurrent arrhythmia, which on one occasion was documented to be a supraventricular tachycardia. Routine chest x-ray revealed an abnormal configuration of the left heart border. A precordial scan with $^{131}$I-labeled albumin provided evidence that the mass on the left heart border was blood filled and strongly suggested that it was cardiac in origin. Pulmonary, followed by left atrial, cineangiography provided the definitive diagnosis and demonstrated extremely slow clearance of radiopaque dye from the appendageal aneurysm. Following surgical removal of the aneurysm the tachycardias have not recurred.

The previous experience in the literature with this problem is briefly presented.

Additional Indexing Words:
Congenital hypertrophy of the left atrial appendage
Congenital diverticulum of the left atrial appendage
Precordial scan

ANEURYSMAL DILATATION of the left atrial appendage as an isolated anomaly is an extremely rare condition. Williams1 in a review of the literature in 1963 was able to find only eight previously reported cases2-7 and added two of his own. Subsequently an eleventh case was reported,8 but in a follow-up report9 the aneurysm was found to arise from the left atrial wall rather than from the left atrial appendage.

Williams divided these cases into intrapericardial type.1 The extrapericardial type was associated with a defect in the pericardium, the aneurysmal atrial appendage herniating out through the pericardial defect.

The intrapericardial type, associated with an intact pericardium, has been verified surgically on only three previous occasions.1, 2, 4

The incidence of arrhythmias and systemic emboli in this type appears to be high.1 In the case reported by Parmley6 it was not clear whether or not there was an associated pericardial defect.

The purpose of this report is to describe the investigation that permitted a preoperative diagnosis of aneurysmal dilatation of the left atrial appendage which, in this case, turned out to be intrapericardial in type.

Case Report
Patient S. L., a 26-year-old housewife was admitted to the Toronto General Hospital on October 28, 1966, for investigation of a “cystic” lesion on the left heart border and recurrent bouts of distressing tachycardia.

The patient was apparently well until age 14, when a heart murmur was first noted. At age 17 a routine chest film revealed a “cyst” on the left heart border. She was married at age 20, and had two uneventful pregnancies at ages 22 and 24 years.

Shortly after the birth of her second child and 2 years prior to her admission for cardiac investigation, she received an intra-oral injection of local anesthetic containing norepinephrine prior to dental repair. Approximately 2 hours
Figure 1
A. Preoperative posteroanterior chest film demonstrating the abnormal configuration of the left heart border caused by the aneurysmal left atrial appendage. B. Postoperative posteroanterior chest film.

Figure 2
A. Preoperative precordial scan with 131I-labeled albumin. The white line superimposed on the scan represents the preoperative cardiac silhouette taken from the preoperative chest film. The mass on the left heart border emitted radioactivity similar to that recorded over the heart, suggesting the mass was blood filled and of cardiac origin. B. Postoperative precordial scan demonstrating the absence of the blood-filled mass on the left heart border. White line superimposed on this scan represents the postoperative cardiac silhouette taken from the postoperative chest film.

After this injection she developed the abrupt onset of rapid, regular palpitations associated with retrosternal chest pain, shortness of breath, and presyncopal feelings. This episode lasted half an hour.

During the course of the next few weeks she returned to the dentist on three occasions and received three further injections of local anesthetic. Each of these injections was followed by a bout of rapid heart action. Each attack commenced earlier, was more severe, and lasted longer than the previous attack, the last episode being present for more than 2 hours.

Seven months prior to admission she received a fifth injection of intra-oral anesthetic prior to dental work and again experienced a protracted
bout of distressing palpitation, which on this occasion was associated with retrosternal chest pain radiating to the left arm.

Three months before admission the patient experienced her first spontaneous attack of palpitations. This lasted for a period of several hours and precipitated her admission to hospital. An electrocardiogram taken during this attack revealed an atrial tachycardia with varying block. Digitalization resulted in reversion to sinus rhythm. Although the digitalis was continued, she developed a further brief attack of palpitations 2 weeks prior to admission.

Physical examination on admission was unremarkable aside from a grade I/IV mid-systolic murmur at the cardiac apex. The heart sounds were normal.

The posteroanterior chest x-ray revealed an abnormal contour of the left heart border (fig. 1A). A chest x-ray with the patient lying on her left side suggested that the mass on the left heart border was extracardiac in origin, in that it fell away from the heart. The electrocardiogram was normal.

A precordial scan with $^{131}$I-labeled albumin (fig. 2A) revealed that the mass was blood filled and strongly suggested that it was cardiac in origin.

Cardiac catheterization was undertaken to elucidate further the nature of the lesion. Pulmonary cineangiography revealed that the mass became opacified during the phase of left heart opacification, the appearance of the mass suggesting an aneurysmal left atrial appendage. Subsequent left atrial cineangiography by the transseptal technique confirmed the presence of an aneurysmal dilatation of the left atrial appendage. The angiographic material remained in the left atrial appendage for 15 to 20 seconds after the left heart had cleared of radiopaque substance. Being guided by small hand injections of radiopaque dye, the transseptal catheter was then introduced through the narrow neck into the aneurysm (fig. 3). A hand injection of 20 cc of radiopaque dye was made into the aneurysm. The dye swirled about in the aneurysm for 15 to 20 seconds (in truly remarkable fashion) again demonstrating the slow emptying of the aneurysm. All intracardiac pressures were

---

**Figure 3**

*The transseptal catheter (outlined by the white broken line) is seen in this figure traversing the neck of the dilated left atrial appendage and lying in the body of the aneurysm outlined by radiopaque dye. (see text).*

**Figure 4**

*Operative view of aneurysmal dilatation of left atrial appendage—indicated by arrow.*

*Figure 5*

*Photomicrograph of the aneurysmal dilatation of the left atrial appendage. Arrow (a) indicates the muscular neck of the appendage and arrow (b) indicates the attenuated fundus of the appendage.*
normal. There was no pressure difference between the aneurysmal appendage and the left atrium. On November 10, 1966, the patient underwent surgery through a left thoracotomy. The pericardium was incised, revealing the aneurysmal left atrial appendage, which measured approximately 8 by 5 cm (fig. 4). The appendage was excised and the stump oversewn. The wall of the aneurysm appeared extremely thin but the "neck" had a much thicker wall.

Microscopic examination of the appendage (fig. 5) revealed that the neck was composed of normal-appearing atrial muscle, lined by endocardium, whereas the fundus of the appendage was found to be attenuated and formed almost solely by fibrous tissue.

The patient's postoperative course was unremarkable. The low-intensity systolic murmur persisted but there has been no recurrence of palpitations. Postoperative chest x-ray (fig. 1B) showed a normal-appearing heart shadow, and the postoperative precordial scan (fig. 2B) revealed the absence of the blood-filled area that was present preoperatively (fig. 2A).

Discussion

Recurrent arrhythmias have been described previously in association with aneurysmal dilatation of the left atrial appendage.\textsuperscript{1, 2} The atrial appendage has been described as being irritable during surgery.\textsuperscript{1, 2} The recurrent supraventricular tachycardia in the present case initially occurred following intra-oral injections of local anesthetic containing nor-epinephrine. Subsequently the attacks occurred spontaneously. Although the patient experienced a run of supraventricular tachycardia during cardiac catheterization, arrhythmia was not a problem at surgery, nor has it been subsequently.

Systemic embolization has been described in this condition,\textsuperscript{1, 5, 6} and in one case\textsuperscript{7} thrombi were discovered in the atrial appendage although embolization did not occur. Judging from the slow clearance of angiographic material from the appendageal aneurysm in the present case, if slowly eddying blood pools are a factor in the production of thrombosis, it would not have been surprising to have found thrombi in the appendage.

Chest pain has been previously reported in aneurysmal dilatation of the left atrial appendage\textsuperscript{1, 4} but in the present patient pain was only associated with bouts of tachycardia at which time the pain had the characteristics of myocardial ischemia. Although the thinness of the wall of the appendageal aneurysm has been commented on previously,\textsuperscript{1} there has been no reported case of rupture.

The only relatively consistent physical finding has been a relatively nonspecific precordial systolic murmur,\textsuperscript{1, 3, 5, 6} which was also present in the case herein reported. An abnormal chest x-ray (fig. 1A), described in all previously recorded cases,\textsuperscript{1-7} may lend a clue to the diagnosis, although an extracardiac mass must be excluded. It is interesting to note in this case that a heart scan appeared to be useful and was of more help in the initial investigation than fluoroscopy. The most definitive technique useful in establishing a diagnosis in these cases is angiography. Successful resection of the abnormal left atrial appendage has been reported in seven previous cases\textsuperscript{1, 3-7} and appears to have been successful in relieving the recurrent supraventricular tachycardias in the present case.

Acknowledgment

The authors wish to thank Drs. C. E. McIlveen and W. G. Grant, of Oshawa, Ontario, for referring this patient, and to acknowledge the kind assistance of Dr. D. E. Wood, Head, Division of Nuclear Medicine, Dr. W. Anderson, Head, Division of Surgical Pathology, and the Department of Medical Photography, Toronto General Hospital. Mr. F. Lammernich of the Department of Art as Applied to Medicine, University of Toronto, aided in the preparation of the figures.

References

Challenges to Scientific Cliches

A critic anxious to find fault might now raise a number of objections, among them these: (1) there is no such thing as a Scientific Mind; (2) there is no such thing as The Scientific Method; (3) the idea of naïve or innocent observation is philosophers’ make-believe; (4) ‘induction’ in the wider sense that Mill gave it is a myth; and (5) the formulation of a natural ‘law’ always begins as an imaginative exploit, and without imagination scientific thought is barren. Finally (he might add) it is an unhappy usage that treats a hypothesis as an adolescent theory.—P. B. Medawar: *The Art of the Soluble*. London, Methuen & Co. Ltd., 1967, p. 132; also distributed by Barnes & Noble, Inc., New York.
Intrapericardial Aneurysmal Dilatation of the Left Atrial Appendage
THOMAS F. GODWIN, PIERRE AUGER, JAMES A. KEY and E. DOUGLAS WIGLE

Circulation. 1968;37:397-401
doi: 10.1161/01.CIR.37.3.397

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 1968 American Heart Association, Inc. All rights reserved.
Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/37/3/397

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Circulation can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Circulation is online at:
http://circ.ahajournals.org/subscriptions/