A Large Pseudoaneurysm Caused by Extrapleural Plastic Ball Plombage

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Collapse therapy of pulmonary tuberculosis by means of plastic plombage is now out of use except in a few clinics or with radical modification. Reasons for this abandonment are a series of complications some of which have led the patients to unhappy outcomes. We have recently met with one of these situations and thought it worthwhile to report it here.

Clinical History: The patient was a 32-year-old man who had been diagnosed as having a tuberculous lesion in his left upper lobe in 1949 and underwent collapse surgery using several plastic balls of larger size at the University Hospital on October 27, 1949. He had not noticed subjective symptoms until July 20, 1956, when he felt a sudden pain and pressure inside his left chest wall after elevation of his left arm. Slight fever, and coughing, without expectoration, lasted for a few days but no pulmonary hemorrhage, or blood-streaked sputum, was noticed. He visited our hospital asking for removal of the plastic balls. We hesitated to operate on him immediately and watched him carefully, for the fever between 99 and 101°F persisted for a long period. While we were still pondering on the indication of removal of plastic balls in this condition, hemoptysis started on August 8, 1956 and within a few days it changed into a profuse hemorrhage exceeding 500 cc. on the night of August 28th. The hemorrhage reached 1,000 cc. the next night and he complained of a severe chest pain which was hardly controllable by injection of large doses of demerol, and he requested immediate thoracotomy and removal of the balls.

Operation: He was subjected to thoracotomy on August 31, 1956. To combat the pulmonary hemorrhage during operation, he was placed in the face-down position, using the table specially built for this purpose. For the same reason regional anesthesia was preferred to general anesthesia, in which preservation of tracheal reflex and maintenance of air-way is a hazardous problem. The regional anesthesia was reinforced by intramuscular administration of M. cocktail consisting of Chlorpromazine 50 mg., Demeral 105 mg. and Prometazine 50 mg. one hour prior to operation.

Three ribs, third, fourth and fifth, were resected following skin incision and division of muscles. Then the thorax was entered through the 5th periosteal bed. Adhesion of the lung to the wall was so severe that detachment required a meticulous manipulation. The lower lobe was almost intact but the upper lobe was compressed to the wall by the pressure from inside. When the hematoma at the lateral edge of the upper lobe was partly removed oozing of blood was met and a gauze pack was placed to control the oozing. The medial-posterior approach was taken next and the thick white pleura at the upper end of the compact upper lobe was incised. Before long a part of a ball surface was disclosed and the ball was extracted with a large clamp. No sooner than the removal, a torrent of arterial blood filled the chest. The operator quickly probed the upper space and floating balls were all extracted in a moment. A large amount of gauze packing was placed in the chest to control the bleeding, and the wound was closed in layers with interrupted silk sutures without delay. The blood loss was at this time 2,000 cc., systolic pressure around 40 mg. Hg., and the patient was unconscious. Treatment with generous transfusion of bank blood and fresh blood, and administration of vasopastics and other drugs helped the patient to overcome the shock stage, and he survived.

The second operation was undertaken a week later. This time the patient was put under general anesthesia with intratracheal intubation, for absence of pulmonary hemorrhage during operation and postoperative days convinced the anesthetist of the safety of this method. We presumed that the bleeding point was in the upper pulmonary vessels. The chest was reopened through the old wound and without removing the gauze pack the lower lobe was mobilized to ease the intrathoracic

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222
A LARGE PSEUDOANEURYSM

maneuver. Then, the hilum was approached from behind. The upper bronchus was exposed and treated after Sweet's method. Dissection of individual vessels seemed difficult, and the remaining hilum structure was ligated together temporarily and the gauze pack was removed one after one. Another massive bleeding of arterial blood succeeded the procedure and further operation was abandoned. The patient again survived the operation but blood seepage from the wound persisted amounting to over 400 cc. a day.

Angiography: To identify the bleeding point, the patient had an angiocardiogram done by the Department of Radiology. The reported findings were as follows:

"The angiogram taken immediately after injection of 76% Urographine 50 cc. through the right saphenous vein reveals no abnormal finding in the right atrium and ventricle, although the trachea, vena cava, and heart are tracted to the right, and posterior portion of the left upper ribs were absent. Lack of filling in the left upper artery is likely due to ligature of the artery at the previous operation.

Angiogram taken four seconds after the injection (Fig. 2) also shows no abnormal findings of the left atrium and ventricle, aortic arch, ascending and descending aorta. Filling of both common carotid arteries, vertebral arteries, and subclavian arteries seem to be normal, but the left subclavian artery shows insufficient contrast in comparison with the right. An unusual finding is in the vault of the left thorax where lies a round or oval homogeneous shadow of clear smooth outline spreading from the upper border of the second rib to the fourth rib. No leakage of the contrast agent was recognized even at the divided end of the intercostal arteries.

Angiogram taken six seconds after the injection (Fig. 3) shows the presence of the above-mentioned round shadow even when contrast agent in other arteries has disappeared, but this shadow also disappeared completely in 30 minutes.

From these findings this round shadow is suspected to be a large aneurysm having communication with the left subclavian or common carotid artery. It is a regret that the lateral angiogram was not available because of difficulties with the apparatus and patient. But it can be learned from the postero-lateral film that the aneurysm had arisen from the subclavian artery which is not filled so well as the common carotid artery. The hemorrhage in patient's history is attributable to this aneurysm which shows homogeneous, smooth and round contour suggesting a relatively fresh aneurysm with incomplete organization."

Autopsy: Three days later in the afternoon, the patient died suddenly following a severe cough and convulsion. Orotracheal suction, and adrenalin injection failed to alter his course.

FIGURE 1: Preoperative x-ray film.
Postmortem examination revealed a large sac communicating with the subclavian artery as indicated by angiograms (Fig. 3). The sac was filled with blood and lined by fibrinous membrane of many layers without any vessel wall structure. Apparently this is a pseudo-aneurysm formed by repetition of bleeding, and coagulation process. The space between the pseudoaneurysm and the lung was filled with clotted blood, and the adjoining visceral pleura had a large defect. There was found no active lesion in the upper lobe but an old partially calcified fibrous lesion. No possible source of profuse hemorrhage such as cavitation or bronchial ulceration was discovered in any lobe. The trachea was filled with mass of clotted blood at the lower end as were the openings of the main bronchi, and the stump of the left upper bronchus had suppurrative change and was partially torn.

Discussion

It is clear from the clinical and postmortem findings that the round edge of a plastic ball adjacent to the subclavian artery gave continuous pressure against the vessel wall for nearly seven years and gradually eroded the anemic necrotized wall structure and finally perforated it. This was followed by bleeding which caused the chest pain and feeling of pressure, and a pseudoaneurysm had grown there. But high arterial pressure did not allow the closure of the perforation and bleeding was repeated, leading to a high pressure in the collapsed space which was in contact with the pathologic lung surface, and gave the outlet for the bleeding through the bronchial route, thus causing preoperative pulmonary hemorrhage. The first operation lessened the pressure in the space by removing the plastic balls. The bleeding was stopped by gauze pack only temporarily. We should have done an angiocardiogram on the patient before the second operation, but the condition of the patient made us hesitate to do it, and we had in mind the pulmonary vessels under the pressure of the ball as the main source of hemorrhage. Thus, we operated the second time, successfully removing the upper lobe, but failed in treating the real source of bleeding. This continued, or even increased following the second operation, and finally pressed into

**FIGURE 2**

*Figure 2: Four seconds after angiographic injection.*

**FIGURE 3**

*Figure 3: Six seconds after injection.*
the bronchial stump, which was already infected, and yielded easily to the pressure, giving way to the flow of blood into the trachea and consequent asphyxia.

The most common complication of plastic plombage has been the perforation of cavity wall, and subsequent empyema. Little attention has been given to the danger of perforation of important intrathoracic vessels. This is unlikely to occur in a short duration after the operation but, if once started, is very difficult to control in time, unless the surgeons, as well as patients, are alert enough to find out this possible danger at an early stage.

We think it is safer to remove the plastic balls as early as possible, if the balls are already in the thorax. We believe plastic plombage as a treatment of pulmonary tuberculosis is an unadvisable procedure except in a few selected cases. Our case teaches us that it is a necessary safeguard against severe complications to substitute for plastic plombage pulmonary resection, or thoracoplasty, even though the patient with plombage does not have any complaint.

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