Patent Ductus Arteriosus with Endarteritis*

Report of a Case Complicated by Pulmonary Infarction, Treated by Ligation of the Ductus and Segmental Pulmonary Resection.

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Surgical interruption of a persisting ductus arteriosus is now a standard and safe procedure. Many series of cases treated surgically have been reported from different parts of the world. The operative mortality is low, whereas it is well established, from the observations of Bullock et al.\(^1\) and others\(^2\) that the mortality and morbidity in untreated cases is comparatively high.

Graybiel, Strieder and Boyer\(^3\) in 1938, first attempted ligation of a patent ductus arteriosus in a patient with subacute bacterial endarteritis. In their case the ductus was not completely obliterated and the patient died on the fourth postoperative day. Two years later Gross and Hubbard\(^4\) carried out a successful ligation in an uncomplicated case and shortly thereafter Touroff and Vessell\(^5\) divided a ductus in a patient with subacute bacterial endarteritis following which the patient made a complete recovery. Such successful treatment has become more common with the advent of penicillin and other antibiotics. Usually the infection factor can be brought under control, temporarily at least, by chemotherapeutic measures. In cases where vegetations have not become established on the endocardium, closure of the ductus aids in sterilizing the bloodstream and published results indicate that only rarely has subacute bacterial infection become manifest again.

Conklin\(^6\) published 12 cases treated surgically, one of which had subacute bacterial endarteritis and he quotes Shapiro\(^7\) who collected 626 cases from the literature in which the ductus had been treated surgically by 43 surgeons. In this group of 626, 88 had had subacute bacterial endarteritis. The mortality in the infected group was 28.4 per cent compared with a rate of slightly over 3 per cent for the uncomplicated group.

In the cases reported here, in addition to closure of the ductus, which was complicated by probable subacute bacterial endarteritis, a segment of infarcted lung was resected and the patient discharged as cured.

Mr. K. G., C.M.C.H. 106,465: This 40 year old farmer was admitted to the hospital on December 15, 1950, with a chief complaint of chills and fever of three months' duration. At the time of his first attack three months previously he consulted a physician and was hospitalized. A diagnosis of patent ductus arteriosus was made and surgical treatment advised. The patient, however, elected to have surgery deferred. Under medical treatment, the chills and fever disappeared and he was discharged asymptomatic. Shortly thereafter an irregular fever again appeared and had been present up to the time of admission. No history of any embolic phenomena could be elicited. For the past year or so the patient had been cons-

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patent

In its normal state the pulse was 80. Physical examination showed that the patient had had chills and a fever of short duration a year previously which had been treated by his local physician. Family history and marital history were non-contributory.

Physical examination showed a well developed and nourished man in no acute distress. His temperature on the day of admission rose to 101.6 degrees F., but the pulse rate was not above 100. Examination of the head and neck revealed nothing abnormal except for poor dental hygiene. There were no petechiae in the sclerae. Examination of the lungs showed no abnormal sign. The heart was enlarged, the left border being 2.5 centimeters beyond the mid-clavicular line. There was a loud to and fro "machinery type" murmur audible all over the precordium, but maximal in the left second interspace near the sternum. The murmur had a systolic accentuation. The blood pressure at rest was 106/40 and after one minute of exercise 114/30. Examination of the abdomen revealed no abnormality. The liver and spleen were not palpable. The extremities were negative and there was no evidence of any petechiae. Laboratory examination on admission revealed a hemoglobin of 8.5 grams, a red blood cell count of 2.6 million, and a white blood count of 9,700 with 74 per cent neutrophils, 2 per cent eosinophils and 24 per cent lymphocytes. The blood smear was negative for malarial organisms. Examination of the urine and stool showed no abnormality.

Roentgenological examination of the chest on December 16, 1950, revealed no abnormality of the bony thorax. There was a marked enlargement of the heart in the transverse diameter and a prominent pulmonary conus (Figure 1). There were increased lung markings out from the hilar area, especially on the right side.

One blood culture taken on December 17, 1950, showed no growth of organisms. Due to the spiking type of temperature elevation and frequent chills the patient was started on 200,000 units of penicillin every four hours. This did not produce a dramatic response, but by the end of two weeks the temperature had settled to normal and it remained there.

Operation was done on January 11, 1951, with the patient in the lateral decubitus position. The left hemithorax was entered through the fifth intercostal space.

**Figure 1:** P-A x-ray film of chest preoperatively showing increased transverse diameter of the heart, enlarged pulmonary conus and increased vascular markings in the lung.  
**Figure 2:** Postoperative x-ray film of chest 14 days after ligation of patent ductus arteriosus with probable subacute bacterial endarteritis and resection of the anterior segment of the right upper lobe.
The lung was free except over the anterior segment of the upper lobe where it was densely adherent to the chest wall and the mediastinum. The adhesions were very vascular. A mass was palpable in the anterior segment which appeared to be inflammatory and not neoplastic. The ductus was short; in fact, no length could be determined except by retracting the aorta and the pulmonary artery; both of which were enlarged. There was considerable inflammatory reaction over the ductus and the pericardium extended completely over it to the aorta. The pericardium had to be opened to mobilize the ductus safely. The ductus, when freed from the surrounding inflammatory tissue, could be stretched to about 6 mm. in length. Temporary obliteration of the ductus resulted in the heart becoming irregular even after injecting the vagus with procaine. An attempt was made three times with the same result. Therefore, 5 cc. of 1 per cent procaine were injected intravenously and a few minutes later the ductus was occluded without trouble. A purse string cotton suture was placed at each end of the ductus and a cotton transfixion suture was placed at the mid-point. A heavy silk tie was placed over this. The mediastinal pleura was closed.

It seemed unwise to leave the lesion in the upper lobe. Therefore, the anterior segment was resected after dividing the artery, vein and segmental bronchus. The chest was closed with two drains left in for drainage. The blood pressure on completion of the operation was 90/60. During the operation 3,250 cc. of blood were given. (There was considerable blood loss from the vascular adhesions).

The postoperative period was uncomplicated and the patient was discharged on January 25, 1951. Figure 2 shows the postoperative x-ray film of the chest. All the signs and symptoms of the patent ductus had disappeared.

The pathological report concerning the segment of lung as described by Dr. E. W. Gault was as follows:

Macroscopic: The specimen consists of a portion of lung (weight 53 grams) roughly pyramidal in shape with a base measuring 3 x 5 cm., and 8 cm. in height. The pleural surface is covered with some blood clot and the pleura is definitely thickened. Upon section there are two areas. Half the tissue consists of air containing lung and the other half is consolidated and pale with a well-marked line of demarcation between it and the air containing lung. At one point, at the junction of the healthy and unhealthy lung, there is some congestion.

Microscopic: Part of the lung shows the shadowy outline of the alveolus with the alveolar walls surrounding spaces filled with air and in other areas containing fibrin, red blood cells and lymphocytes with occasional granulocytes. The structure of the alveolar wall has undergone considerable change so that the endothelial nuclei cannot be seen. Some of the alveolae are filled with red blood cells. Near the edge of the infarcted area a thrombosed artery can be seen undergoing canalization. At the edge of the infarcted area there is organizing granulation tissue containing young capillaries and fibroblasts.

Diagnosis: Organizing Infarct, lung.

A communication from the referring physician states that the patient was entirely well and asymptomatic for six months after discharge. There was no recurrence of the chill and fever which he had had previously and he was engaged in his normal activities. Following some type of a domestic quarrel, he committed suicide. The referring physician learned of his death the following day by which time the body had been cremated, as is the custom here, and consequently a postmortem examination was not done.

Discussion

We have recently reported7 two cases of persisting patent ductus arteriosus treated surgically. Since the preparation of that report an additional
four cases have been treated, one of which is the basis of this report. Five of the six patients have been cured, but one died of bronchopneumonia postoperatively. This patient was a child one and one-half years of age who had already been in congestive failure on two occasions. It has been repeatedly emphasized that it is far better to wait until patients with patent ductus are at least three years of age before operating upon them, but it was the opinion of the pediatrician that the child would not survive that long without surgery. The patient had had rather extensive bronchopneumonia four weeks before operation, but the pediatrician and ourselves both believed that the pulmonary process had completely subsided before operation. Postmortem investigation, however, showed a very extensive bronchopneumonic consolidation mainly involving the right lung.

SUMMARY

1) Subacute bacterial endarteritis is not a contraindication but rather a further reason for surgical interruption of patent ductus arteriosus.

2) Since the advent of penicillin the infection can usually be controlled as a preliminary measure to surgery.

3) A case is reported in which in addition to ligation of the ductus in a patient with presumed endarteritis, a segmental lobectomy was done for an apparently chronic inflammatory process which clinically, and on pathological examination, proved to be an infarct.

RESUMEN

1) La endarteritis bacteriana subaguda no es una contraindicación sino una razón más para la interrupción quirúrgica del ductus arteriosus.

2) Desde el advenimiento de la penicilina la infección puede habitualmente ser dominada antes de que se tratar el ductus quirúrgicamente.

3) Se relata un caso en el que además de la ligadura del ductus en un enfermo en quien se presumía la endarteritis, se hizo una lobectomía segmentaria por un proceso aparentemente crónico inflamatorio, que clínicamente e histológicamente demostró ser un infarto.

RESUME

1) Une endartérite infectieuse subaiguë n'est pas une contreindication mais au contraire une raison de plus d'intervenir dans les cas de persistance du canal artériel.

2) Depuis que nous avons à notre disposition la pénicilline, il est possible de juguler l'infection d'une façon courante, avant de passer à l'acte chirurgical.

3) Les auteurs rapportent une observation dans laquelle on pratiqua un traitement du canal artériel atteint vraisemblablement d'endartérite, et dans laquelle on associa une lobectomie pour une lésion apparemment chronique du poumon, qui se révéla être cliniquement un infarctus à l'examen anatomo-pathologique.
REFERENCES


7 Shapiro, M. J.: "Recent Advances in Surgical Treatment of Patent Ductus Arteriosus, Modern Concepts of Cardiovascular Disease," 16:1, 1947, quoted by.6