5. Surgical Treatment of Portal Hypertension of Post-hepatic Origin, with Special Reference to Trans-cardiac Membranotomy for Membranous Obstruction of the Hepatic Portion of the Inferior Vena Cava

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In view of the possible involvement of the inferior vena cava in the obstructive process, the following surgical treatments are suggested for portal hypertension of posthepatic origin, or Chiari syndrome: a) fixation of the superior surface of the liver to the inferior surface of the diaphragm (Drummond and Morison\(^1\), Madden\(^2\)), b) transposition of the spleen into the thoracic cavity (Hoffman\(^3\), Turunen\(^4\)), c) fixation of the omentum to the bone marrow of the divided sternum (Imanaga\(^5\)) and d) hepatopneumopexy (Akira\(^6\)). These surgical methods aim to form collaterals which drain portal or hepatic blood into systemic or pulmonary veins proximal to the site of obstruction.

On the other hand, a more causal, more radical approach is desirable if the obstruction is localized to the inferior vena cava. However, few attempts have been successfully made to directly attack such an obstruction. This is mainly due to the great difficulty in approaching and correcting the obstructive portion.

In 1960, a patient with Chiari syndrome was referred to us for a surgical treatment. Caval venography disclosed the presence of an occlusion of the inferior vena cava at the level of the hepatic vein orifices. An attempt was made to correct the obstruction by abdominal approach. However, an uncontrollable bleeding occurred when one of the well-developed collaterals was injured. The patient died soon after the operation. Nevertheless, this case has given us an important pathological finding, suggesting a new surgical approach: The caval obstruction is caused by a fibrous septum which is as thin as a membrane, and can be ruptured by a finger inserted retrogradely through the right atrium.

In the following year, a patient with the same lesion was successfully treated by what we call “trans-cardiac membranotomy”\(^7\). Since that time we have observed another four cases. Since these cases have clinically and pathologically common features, they may be regarded as constituting a disease entity. In order to give a clear concept of this disease, its clinical and pathological pictures are shown by a film, together with its surgical treatment.

Common symptoms and signs are as follows: Subcutaneous venous engorgement, edema and weakness or lower extremities, abdominal distension with ascites, enlargement of the liver and spleen and esophageal varices. Most of these symptoms are related to stagnation of either the portal or inferior caval system. The superficial venous engorgement is seen not only over the abdomen, but also over the flanks and back, where the blood flows from below upward. This is characteristic of inferior caval obstruction and cannot be confused with the venous pattern of liver cirrhosis. Pigmentation and varicose ulcers of the legs are also seen. The patient may show gastrointestinal ailments such as abdominal pain, nausea, vomiting and diarrhea. Occasionally cardiac and nervous symptoms supervene.

The systemic venous pressure distal to the obstruction is usually elevated to about 300 mm. H\(_2\)O. This finding helps to differentiate an inferior caval obstruction from other conditions causing generalized venous pressure elevation such as right side heart failure.

The final diagnosis cannot be established without the caval venography using two catheters, one placed above and the other below the obstructive portion. By this technique the extent of the obstruction is evaluated and the operative indication given.

According to the venography, the membranous obstruction always occurs at the same level of the inferior vena cava, i. e., slightly below the diaphragmatic hiatus and immediately above the right hepatic vein ostium. The left hepatic vein orifice is frequently obliterated.

These findings are confirmed by autopsy. Histologically the membranous structure is com-

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posed of connective tissue which is externally lined with the endothelium and continues to the intima of the venous wall. The liver shows cirrhotic and/or congestive pictures.

Etiology is still controversial. Presumably the membrane is either of congenital or of thrombophlebitic origin. In adjunct of etiological study cineangiography of canine fetuses are shown. It was taken immediately after cesarean section while the placental circulation was kept intact. Hemodynamic observation was made before and after the onset of respiration.

Treatment—As stated before, we have developed trans-cardiac membranotomy for the causal treatment of this condition. It is similar to commissurotomy for mitral stenosis. A right intercostal thoracotomy or longitudinal sternotomy is carried out and the pericardium is widely opened. The index finger is inserted into the inferior vena cava through a small incision in the right atrium. After careful palpation the membrane is fractured. As compared with other radical treatments such as trans-diaphragmatic method, this trans-cardiac approach has the following advantages:

a) The technique is simple.

b) The operative intervention is relatively small with minimal injury to the vital collaterals. This is very important, because we are not infrequently dealing with a poor-risk patient who cannot tolerate a major operation which causes a considerable amount of blood loss and hence requires its replacement.

c) The adjacent venous wall and surrounding tissues are kept intact, so that post-operative stricture may be prevented.

On the other hand, the disadvantages of this method may be a) occurrence of pulmonary embolism, b) lack of visual control and c) limited indication (e.g., in case of an extensive obliteration an open method with venous grafting is required). Pulmonary embolism can be prevented to some degree if blood is allowed to flow out

Explanation of Plates

(A)  
Fig. 1. Caval venography before (A) and after (B) transcardiac membranotomy.

(B)
through the atrial incision immediately after the membranotomy. Whether the membrane is correctly ruptured is ascertained by touching the tip of the catheter which is in advance placed below the obstruction.

Thus far, four patients have been treated by this method. After the operation venous dilatation and ascites disappeared, edema subsided and varicose ulcers healed. However, the postoperative course is not always uneventful, complicated by pericardial and pleural effusion, wound abscess, hematoma, pulmonary embolism, oliguria etc. One patient died in anuria on the third postoperative day; other three are in good health. The postoperative care includes effective drainage, oxygen inhalation, administration of adequate anticoagulant, antibiotics and intravenous fluids.

As for the incidence of this disease, we do not think that it is so rare as the paucity of the reported cases indicates. According to our statistical analysis in Japan this type of lesion makes up about 30% of posthepatic venous obstruction. Recently reports of similar cases have been on the increase. It is noteworthy that in former days the disease was often confused with liver cirrhosis and treated conservatively as such until its true nature was revealed by autopsy. If the presence of this disease is kept in mind and patients with portal hypertension or liver cirrhosis are carefully examined, more cases will be discovered and adequately treated.

REFERENCES

6. Endovenectomy for the Surgical Treatment of Budd-chiari's Syndrome

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We performed endovenectomy for a case with Budd-chiari's Syndrome. The case will be presented here briefly.

The patient is fifty year old male suffering from the dilatation of the veins in the abdominal wall, abdominal distention, edema of the lower extremities, dysarthria and tremor of the hand.

Preoperative laboratory tests reveal severely disturbed liver function, i.e., BSP retention 23% at 45 minutes, C.C.F. Ⅲ at 24 hours, and the value of serum ammonium 1.22 g/dl. Venography of the inferior caval vein reveals a membranous complete obstruction at the site of the diaphragm. Left hepatic vein is invisible.

Operation was performed by following procedure.

The right thoractomy was performed postero-laterely in the ninth costal bed. Diaphragm was incised and the inferior caval vein was carefully exposed distally between the liver. The obstructed narrow portion of the caval vein was one and a half cm length. Endovenectomy was done with temporal occlusion of the caval vein; thus some venous return from the obstructed left hepatic vein was noticed. copious amount of venous blood rushed out from the distal inferior caval vein on release of occlusion. The caval vein was closed by continuous running sutures. Diaphragm was repaired and the closure of the thorax with drainage was done. Post-

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