Acta Medica et Biologica
Vol. 46, No.2, 71, 72, 1998

A New Method for the Repair of the Diaphragm during Surgery for Thoracoabdominal Aortic Aneurysms

Hisanaga MORO, Nobuo YAGI, Takashi NAKAYAMA, Osamu NAMURA, Hajime OHZEKI and Jun-ichi HAYASHI

The Second Department of Surgery, Niigata University School of Medicine, Niigata, Japan

Received April 17 1998; accepted May 7 1998

Summary. **We designed a new procedure for the repair of the diaphragm during operations for thoracoabdominal aortic aneurysms. Both complete hemostasis and easy repair of the diaphragm were effected by the use of the autosuture. No complications occurred during the postoperative period. The autosuture is thus a useful technique in the repair of the diaphragm.**

Key words—repair of diaphragm, thoracoabdominal aneurysm, autosuture.

INTRODUCTION

Operative approachs for incising the diaphragm in operations for thoracoabdominal aortic aneurysms or Budd-Chiari syndrome can be quite complex. The repair of the diaphragm has been performed by segmental ligation and incision, or by coagulation and cutting using an electric surgical knife. The former requires much time for the incision and repair of diaphragm; the other causes bleeding from the incised edges and cutting by needles. With both of these drawbacks in mind, we designed a new method using the autosuture for the repair of the diaphragm.

TECHNIQUE

The Stoney spiral incision was performed on a 62-year-old man with a thoracoabdominal aortic aneurysm (Crawford type I). The diaphragm was revealed after a left lateral thoracotomy on the seventh intercostal space. A circumferential incision carried out to spare the innervation of the diaphragm was then performed on the diaphragm using the autosuture (Multifire GIA 80 Titanium ; AutoSuture Japan Inc.) with the staple line of 86 mm and staple size of 3.0× 3.85mm (Fig. 1). In order to incise the entire diaphragm, the autosuture was used three times for only a few minutes. There was no bleeding from the incised edge. After replacement with a prosthetic graft and the reconstruction of spinal cord arteries and visceral vessels were performed under the cardiopulmonary bypass using heparin sodium, the diaphragm was sewn up using 2-0 polypropylene sutures in the fashion of repeated running sutures (Fig. 2). There was no occurrence of either diaphragmatic hernia, nor subphrenic abscess in the postoperative period (Fig. 3).

DISCUSSION

The diaphragm can be abundantly perfused from musculophrenic, pericardiaco-phrenic, and inferior phrenic arteries, and has comparatively good blood circulation. In general, it has been segmentally incised and ligatured in order to attain complete hemostasis. Consequently, a considerable amount of time is commonly spent on its repair. Moreover, the diaphragm is not always easy to sew up because the edges of diaphragm are segmentally ligatured and the tension draws together the other edges except for the ligatured parts, resulting in the diaphragm being cut by the sutures. In the light of this, we designed a new repair method using the autosuture. Its use with a stapler has already been reported[1,2], and the secu-

Correspondence: Dr. Hisanaga Moro, the Second Department of Surgery, Niigata University School of Medicine, 1-757 Asahimachi-dori, Niigata 951-8510, Japan.

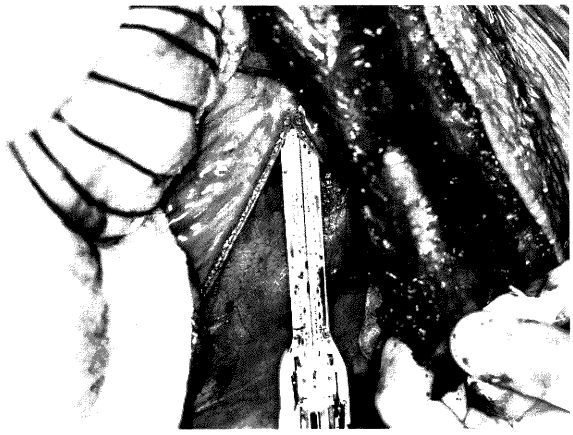

Fig. 1. Photograph of the diaphragm incised using the autosuture.

Fig. 2. Photograph after the repair of the diaphragm. Arrows indicate the sutured line on the diaphragm.

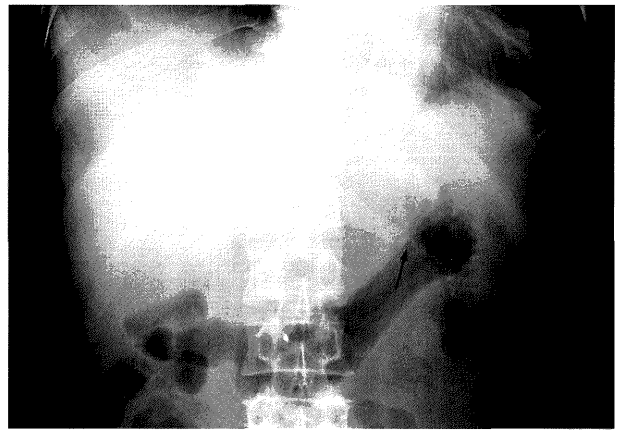

Fig. 3. Abdominal X-ray in the postoperative period. Arrow indicates staple on the diaphragm.

rity and usefulness of the autosuture has generally been recognized in the field of respiratory surgery. In our procedure, the staples were lined up in four files on the stapler, and they were lined up in two files at both edges while the diaphragm was incised. When the diaphragm was sewn up, the needles were prevented from cutting it, and complete hemostasis was achieved, owing to the reinforcement of staples lined up in two files. The thickness of diaphragm is generally less than 5.0mm. In this case, the size of the staplers used was 3.0×3.85 mm, and the size of the fired staplers was 1.5mm, affording sufficient reinforcement in the diaphragm edges. Conventionally, we repaired the diaphragm using a horizontal mattress and running 2-0 sutures. We needed about 20 to 30 min to repair the diaphragm using the conventional method, while only a few minutes using the new method. As a result, the repair of the diaphragm was smoothly and easily performed. We have already performed repair of diaphragm using this new method on three patients. We have seen no complications such as diaphragmatic hernia, subphrenic abscess, or the need for reoperation for hemostasis. In conclusion, we have found the repair of the diaphragm using the autosuture to be a very useful method.

REFERENCES

1) Amosov NM, Berzovsky KK: Pulmonary resection with mechanical suture. *J Thorac Cardiovasc Surg* **41**: 325-335, 1961.
2) Forrester-Wood CP : Bronchopleural fistula following pneumonectomy for carcinoma of the bronchus. Mechanical stapling versus hand suturing. *J Thorac Cardiovasc Surg* **80**: 406-409, 1980.