Stabilisation of the Unstable Fractured Zygomatic Arch with a Ballooned Foley Catheter

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Abstract The zygomatic arch fracture is one of the most common facial bone fractures. Especially the isolated zygomatic arch fracture is usually repaired via Gillies' approach. But in the case of unstable zygomatic arch fracture, we need an additional step for stabilising the unstable zygomatic arch segment after repositioning the fractured segment. For the stabilising method we use the ballooned Foley catheter on the medial side of the zygomatic arch in the zygomaticotemporal fossa. This method is of assistance to the patient who has a zygomatic arch fracture with comminution or an old patient with weak and torn periosteum. In this study, we achieved a good result and we will introduce this simple method as one of alternatives of stabilising tool.

Keywords Zygomatic arch fracture · Foley catheter

Introduction

Up to now many various surgical restoration methods for the zygomatic arch fracture have been introduced. Especially Gillies' temporal approach is the most commonly used method for the isolated arch fracture [1]. The transvestibular approach was introduced by Keen [2]. Dingman also introduced the supraorbital approach [3]. But the disadvantage of these methods is a limitation of the prevention of re-depression of the fractured segment after reduction. So additional step is necessary to prevent the re-

depression of the fractured segment. Several previous researchers have introduced several percutaneous methods using towel clips or Kirschner wire to maintain the restored position of the fractured segment [4–6]. But these methods also have a limitation in the case of fractured zygomatic arch with severe comminution. But the final result of the operation using a percutaneous method depends on the operator's skill. Chin et al. have introduced the method of alloderm stabilisation for prevention of the re-depression. But it may have a risk of the limitation of the temporo-mandibular joint motion. So we will introduce the Foley catheter method as one of the alternatives of stabilising tool.

Materials and Methods

We have repaired the isolated zygomatic arch fracture using Foley catheter stabilisation after repositioning the fractured segment through the Gillies' temporal approach from 2003 to 2010. Eight male and 4 female patients were treated with this method. The patient age was ranged between 7 years old and 81 years old. The average age was 52 years old.

Surgical Technique

On every patient the surgical fields were introduced via Gillies' temporal approach with a transverse incision about 2 cm on the temporal scalp. Surgical dissection was carried on the layer of just superficial to the temporalis muscle. The zygomatic elevator was used to reduce the fractured segment of the arch. The repositioned arch side was compared with normal side arch using fingers palpation on

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the skin. After confirming the normal reposition the Foley catheter was inserted on the medial side of the repositioned zygomatic arch segment. The ballooning point of the Foley catheter was focused on center of the fractured segment for helping the stabilisation (Fig. 1). After ballooning the fracture segment was rechecked about the position and external contour. The outside part of the Foley catheter was securely anchored to the temporal scalp skin with Nylon 2-0 suture material to maintain the position of the inserted ballooned catheter. The incised scalp was repaired layer by layer after cleaning up the surgical field with normal saline irrigation. Patient was discharged on the day after operation without external protection. After 2 weeks the Foley catheter was removed at the out-patient office. The patients were taught to avoid the fractured site not to be dependent

on sleep for additional 2 weeks. For the radiologic study, we preoperatively made a computed tomography and an X-ray examination. For the immediate and 2 weeks views after surgery, we made X-ray examinations (Fig. 2).

Results

Every patient had no experience of complication such as infection or temporomandibular joint limitation. There is no difficulty in the daily lives. During the period of Foley catheter insertion, the patients have taken a food enough without limitation on mastication.

Discussion

The zygomatic arch fracture was easily approached and repaired via various methods including Gillies' temporal [1], Dingman's supraorbital [3], and Keen's transvestibular [2] approaches. In the case of stable zygomatic arch fracture including intact periosteum, the repositioning procedure of the fractured segment via above mentioned approaches is enough for treatment. But it is true that there are so many cases of unstable and comminuted fracture with torn periosteum in the zygomatic arch fracture. In these cases more attention must be paid on the prevention of the re-depression after repositioning of the fractured segment. But we have a difficulty to achieve a good result with above mentioned various methods alone. Several researchers have previously made an effort to overcome the limitation of these methods. One of the alternatives was the external splinting method using an aluminum splint [7].

Fig. 1 Position of the ballooned Foley catheter and its relation to the zygomatic arch

Fig. 2 **a** Preoperative X-ray view of isolated arch fracture. **b** Immediate postoperative X-ray view of stabilisation with Foley catheter after reduction. **c** Postoperative X-ray view on 1 month after reduction without Foley catheter

Some researchers have used the Kirschner wire to fix the repositioned fractured segment [5, 6]. The methods using Kirschner wire is at risk of infection and scar around the entry site of the wire. And the patient is inconvenient with external Kirschner wire on their face. Another method was introduced by Camilleri et al. using Gillies' approach and external Kirschner fixation. This method has an advantage on the patient's convenience. But the result of this method may depend on the operator's skill.

Up to now several methods for internal support have been introduced. These include the using of an epistaxis balloon catheter [8] or silicone nasogastric tube [9]. Another method of using alloderm roll was introduced by Chin in 2006 [10]. Because of large size of 6×1.5 cm alloderm roll it may have a risk of the limitation of the temporomandibular joint motion.

We have used a 12 French-thick Foley catheter for the internal support after repositioning the fractured zygomatic arch. The advantage of the ballooned Foley catheter method over others methods is the possibility of readjusting the volume of the balloon to maintain the appropriate position of the fractured segment. This method is as very simple as any operators to get a good result. There is no need of any special tool. And the Foley catheter is easily gotten in the operating room. The inserted Foley catheter is easily removed at the out-patient office.

Conclusion

The isolated zygomatic arch fracture is easily reduced via various methods that introduced until now. But in the case of unstable zygomatic arch fracture such as the fracture with comminution or old patient's fracture with torn

periosteum, we think that the most important thing is internal support on the medial side of the zygomatic arch after reduction. The method using Foley catheter is very simple. It gives us a good result and we introduce this simple method as one of alternatives of internal support for stabilization of the fractured zygomatic arch after repositioning.

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