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Comparison of Surgical Outcome Between Anterior Cervical Discectomy and Fusion (ACDF) with Transcorporeal Anterior Cervical Microforaminotomy for Brachalgia

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Original Research Article

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Abstract: Anterior Cervical Discectomy and Fusion (ACDF) is generally performed for brachalgia and is linked with significant complication such as spinal cord injury recurrent laryngeal palsy, infection or swallowing issue. The Anterior cervical microforaminotomy (ACMF) approach includes for the immediate evacuation of the compressive variation from the norm and the conservation of the movement fragments without bone combination or post-agent immobilization. The general aim of the study is to assess the surgical outcome between Anterior Cervical Discectomy and Fusion with Transcorporeal Anterior Cervical Microforaminotomy. Single institutional retrospective analysis. The outcome of both interventions were compared through statistical method. A total 60 ACDF and 40 ACMF were performed. There were no difference in the preoperative neck and VAS score. A single prospective study of modified transcorporeal anterior cervical microforaminotomy was analysed in a private hospital (Comfort Hospital), Dhaka, Bangladesh. Patients having pure brachialgia who was not relieved by conservative treatment over 6-8 weeks in cervical disc prolapse was included in the study. Patients having more than one level disease, features of myelopathy or instability were excluded from the study. In the investigation, ACMF the Vas Score 7, 8 and 9 was among 52.5 percent, 42.5 percent and 5 percent of the aggregate patients individually after the medical procedure. Besides, Preop/Postop was 0 and 1 in the 20 and 80 patients respectively. On the other hand in ASDF the Preoperative VAS Score 7 among 51.67% patients followed by 8 and 9 were among 45%, and 3.3% respectively. On the other hand Post operative VAS Score 0 among 75% patients followed by 2 were only 11.67% and 1 were 13.33%. Bath ACDF and ACMF delivered significant improvement in VAS neck and Arm scores. Degree of improvement of VAS neck and VAS arm are almost similar between both groups with a trend favoring the ACMF group. In ACMF Immediately after surgery all patients were pain free, but 2 out of 40 patients developed brachialgia after one to two months and needed anterior cervical discectomy and fusion. ACMF can be in important alternative to ACDF in treating patients with brachalgia without a significant risk for ACDF revision surgery at the index level. With astute patient selection an ACMF is a safe operation, giving good results in over 90 %. The advantages of the operation include preservation of the motion segment, direct removal of the compressive abnormality, avoidance for the need for fusion and faster recovery.

Keywords: ACMF, Surgery, Cervical brachialgia, ACDF.

INTRODUCTION

For degenerative spinal diseases, anterior cervical discectomy and fusion (ACDF) has been one of the most usually performed procedures with more than five million operations conducted in the United States between 1990 and 1999[1]. The main indications are for the treatment of cervical myelopathy and radiculopathy secondary to cervical disc prolapsed and osteophyte

compression. It has also been used to treat a range of other cervical diseases (mainly between C3 and T1 vertebrae) associated to cervical instability (degenerative, traumatic, oncological, infectious, inflammatory, iatrogenic)[2].

One of the appropriate approaches is the transcorporeal anterior microforaminotomy. The advantage of this system is that it furnishes coordinate decompression of the pathology with insignificant infringement of the plate space, in this manner keeping up the uprightness of the circle [3]. It also diminishes tissue harm linked with open methods and abbreviates healing facility stay and the speed of recuperation [4].

We have reformed the system of upper vertebral transcorporeal foremost foraminotomy for the treatment of cervical radiculopathy by abstaining from breaking the average mass of transverse foramen and endeavoring to protect the lower end plate. After wards, we evaluate the results and specialized issues with a precise end goal to measure the viability of this method.

Objective

The general goal of the study is to evaluate the surgical outcome between Anterior Cervical Discectomy and Fusion with Transcorporeal Anterior Cervical Microforaminotomy.

Methodology

Patients & methods

- In this study the patients were carefully chosen according to their age from 32 years to 68 years with history of brachialgia & cervical radiculopathy. Male to female ratio was 3:1.
- All patients underwent modified transcorporeal anterior cervical microforaminotomy at one level. All patients had cervical herniated disc due to degenerated disc disease. All had paracentral disc herniation.
- During experiment each Patients were reviewed prospectively, clinical & radiological features were studied in details. Patients who had done cervical x-ray, computed tomography & magnetic resonance imaging of cervical spine.
- Data were calculated preoperatively & postoperatively as well.
- Clinical features & radiological features of postoperative patients were studied & investigated at first week & two months after surgery.

Operative procedure (ACMF)

- The surgical approach is made from the brachialgia side similar to the conventional anterior cervical discectomy with a 3-4 cm transverse skin incision is made at one level higher than the affected level (i.e. for a C5-6 disc herniation skin incision would be like C4-5).
- Sharp and blunt dissection through various layers of deep cervical fascia was carried out, prevertebral fascia was opened, the midline on the anterior surface of the upper vertebral body was marked by C-arm in relation to two longus colli muscles (LCM).
- The longus colli was dissected subperiosteally and self retaining retractor was placed.
- The portion of drill hole is 4-6 mm above the lower vertebral border at the inferolateral portion of the upper vertebra
- A 5-6 mm drill hole is made from medial to lateral direction so as to open the foramen, avoiding damage to the medial wall of the tranverse foramen and underlying endplate.
- After drilling the vertebral body at its end of the foraminotomy hole microcurette and microhook can be used to breach the posterior longitudinal ligament, extruded portion of the disc was then removed by micro-hook and micro-rongeur.
- The adequacy of foraminal decompression is checked by blunt hook and CSF pulsation can be seen at the end of the procedure.

Operative procedure (ACDF)

There are seven steps to the process. The operation usually takes 1 to 3 hours.

Step 1: prepare the patient

Patients will lie on Patients back on the operative table and be given anesthesia. Once asleep, patients neck area is cleansed and prepped. If a fusion is planned and patients own bone will be used, the hip area is also prepped to obtain a bone graft. If a donor bone will be used, the hip incision is needless.

Step 2: make an incision

A 2-inch skin incision is made on the right or left side of neck (Fig. 2). The surgeon makes a tunnel to the spine by moving aside muscles in neck and retracting the trachea, esophagus, and arteries. Finally, the muscles that support the front of the spine are lifted and held aside so the surgeon can clearly see the bony vertebrae and discs.

Step 3: locate the damaged disc

With the aid of a fluoroscope (a special X-ray), the surgeon passes a thin needle into the disc to detect the affected vertebra and disc. The vertebrae bones above and below the damaged disc are spread apart with a special retractor.

Step 4: remove the disc

After that the outer wall of the disc is cut. The surgeon removes about 2/3 of patients disc using small

grasping tools, and then looks through a surgical microscope to remove the rest of the disc. The ligament that runs behind the vertebrae is detached to reach the spinal canal. Any disc material pressing on the spinal nerves is removed.

Step 5: decompress the nerve

Bone spurs that press on patients nerve root are removed. The foramen, through which the spinal nerve exits, is enlarged with a drill. This technique, called a foraminotomy, gives patients nerves more room to exit the spinal canal.

Step 6. prepare a bone graft fusion

Using a drill, the open disc space is arranged on the top and bottom by removing the outer cortical layer of bone to expose the blood-rich cancellous bone inside. This "bed" will hold the bone graft material that patient and patient surgeon selected:

- **Bone graft from your hip.** A skin and muscle incision is made over the crest of patients hipbone. Next, a chisel is used to cut through the hard outer layer (cortical bone) to the inner layer (cancellous bone). The inner layer comprises the bone-growing cells and proteins. The bone graft is then shaped and placed into the "bed" between the vertebrae.

- **Bone bank or fusion cage.** A cadaver bone graft or bioplastic cage is filled with the leftover bone shavings containing bone-growing cells and proteins. The graft is then tapped into the shelf space.

During fusion the bone graft is often strengthened with a metal plate screwed into the vertebrae to provide stability. An x-ray is taken to verify the position of the graft, plate, and screws.

Alternative option: artificial disc replacement

Instead of a bone graft or fusion cage, an artificial disc device is inserted into the empty disc space. In select patients, it may be beneficial to preserve motion. Talk to your doctor – not all insurance companies will pay for this new technology and out-of-pocket expenses may be incurred.

Step 7. close the incision

The spreader retractors are removed. The muscle and skin incisions are sutured together. Steri-Strips or biologic glue is placed across the incision.

Period of operation

The period of operations was from 05th January 2015 to 02th December 2017. Total duration was 1 years 10 months 27 days.

RESULTS

Figure 1 show that in ACMF around 95% and in ASDF 90% patients showed no complication after the surgery. However, in ACMF only 5 percent within the patients (2 patients) have complication in the surgery and residual disc. The two patients have complication were both male and female.

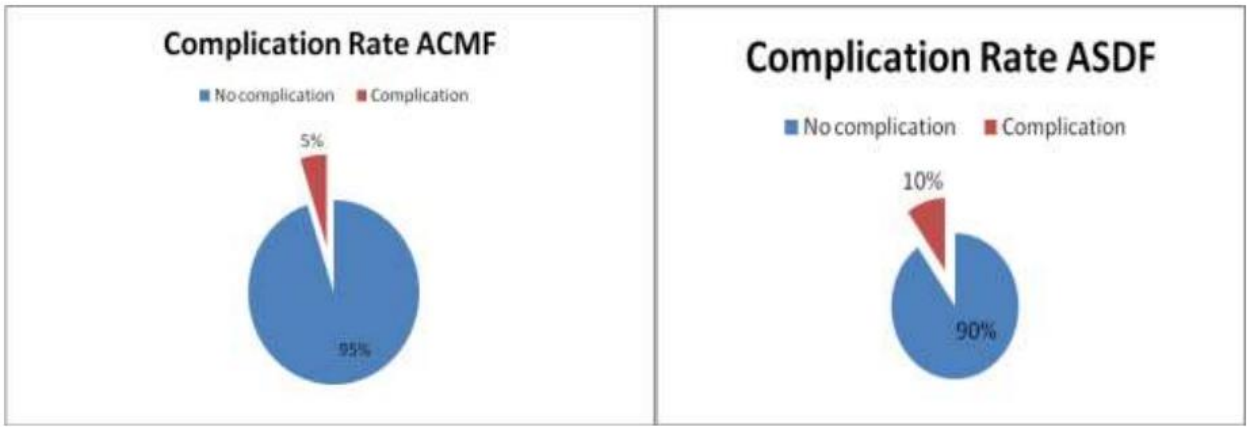

Fig-1: ACMF and ASDF Complication Rate after the Surgery

The following Table 1 shows that, in ACMF the Preoperative VAS Score 7 among 52.5% patients followed by 8 and 9 were among 42.5%, and 2.5% respectively. On the other hand Post operative VAS Score 0 among 80% patients followed by 1 were only 20%.

Table-1: Pre and Post-Operative VAS Scores in ACMF

Pre Operative VAS Score	Number of Patients	%	Post Operative VAS Score	Number of Patients	%
9	01	2.5	1	08	20
8	17	42.5	0	32	80
7	21	52.5	-	-	-
Total	40	100		40	100

The following Table 2 shows that, in ASDF the Preoperative VAS Score 7 among 51.67% patients followed by 8 and 9 were among 45%, and 3.3% respectively. On the other hand Post operative VAS Score 0 among 75% patients followed by 2 were only 11.67% and 1 were 13.33%.

Table-2: Pre and Post-Operative VAS Scores in ASDF

Pre-Operative VAS Score	Number of Patients	%	Post Operative VAS Score	Number of Patients	%
9	02	3.33	2	8	13.33
8	02	3.33	1	7	11.67
8	25	41.67	0	45	75.00
7	31	51.67	-	-	-
Total	60	100		60	100

DISCUSSION

After fusion anterior cervical microforaminotomy (ACMF) objectives to preserve motion at the operated level and hopefully avoid disc degeneration at adjacent levels secondary to reduced movement. In this study we analyzed our results of anterior cervical microforaminotomy for cervical radiculopathy.

The total 40 patients were nominated for this study according to their age from 32 years to 68 years with the previous history of brachialgia& cervical radiculopathy which was conducted at "Comfort Hospital". Among the patients, the male patients were 33 and female patients were 7 having the ratio of 3:1. Furthermore, the patients experienced altered transcorporeal foremost cervical microforaminotomy(a type of minimally invasive spine surgery that helps relieve pressure on spinal cord or nerve roots. It is also recognized as decompression) for once. All patients had paracentral circle herniation and cervical herniated plate due to worsened circle malady or due to generated disk disease. During the study clinical & radiological features of the patients were studied in detail. Clinical features and radiological features of postoperative patients were considered and broke down at first week and two months after medical process.

The surgical approach was produced using the brachialgia side carefully like the traditional front cervical discectomy with a 3-4 cm transverse skin entry point is made at one level higher than the influenced level. We had to reform the arrangement of upper vertebral transcorporeal preeminent foraminotomy for the treatment of cervical radiculopathy by avoiding breaking the normal mass of transverse foramen and attempting to secure the lower end plate. Sharp and blunt dissection through different layers of profound cervical fascia was done, paravertebral fascia was opened, and the midline on the front surface of the upper vertebral body was set apart by C-arm in connection to two longuscolli muscles (LCM).

In 2016 and 2017 the aggregate 40 patients experienced the adjusted transcorporeal foremost cervical microforaminotomy medical procedure. The current investigation demonstrated that the survival rate was in excess of 95 percent. Still, only 5 percent within the patients (2 patients) didn't survive the surgery. Also, the two patients were both male and female.

This inquiry has a few likenesses with another examination where no entanglement was seen. Nonetheless, intricacies were seen in just 2 patients. Comparative inspections found that the entanglements occur because of the adjoining portion's appearance of the disease.[5]In the investigation, ACMF the Vas Score 7, 8 and 9 was among 52.5 percent, 42.5 percent and 5 percent of the aggregate patients individually after the medical procedure. Also, Preop/Postop was 0 and 1 in the 20 and 80 patients respectively. On the other hand in ASDF the preoperative VAS Score 7 among 51.67% patients followed by 8 and 9 were among 45%, and 3.3% respectively. On the other hand post-operative VAS Score 0 among 75% patients followed by 2 were only 11.67% and 1 were 13.33%.

A couple of previous investigations have verified that arthrodesis of a cervical development area prompts extended weight, stack, and intradiscal weights at the level neighboring the mix build. Such powers likely stimulate degenerative changes in levels bordering arthrodesis which could incite clinical disintegrating requiring further intercession [5].

The customary adjusted transcorporeal foremost cervical microforaminotomy medical process taken after by combination is a protected, coordinate, and connected with higher achievement rate for the treatment of cervical discogenic diseases[6]. But ACMF has some potential difficulties such as loss of a motion segment, graft or instrument failure. ACMF can overcome the disadvantages connected with ACDF, such as the increased load on the adjacent segment due to fixation, pain and infection resulting from bone harvesting, a relatively long stay in the hospital, and the necessity to wear prosthetics[7, 8].

CONCLUSION

For the treatment of cervical discogenic diseases conventional ACDF surgery followed by fusion is a safe, direct, and associated with higher

success. But it ensued with potential complications such as loss of a motion segment, graft or instrument failure, or the development of adjacent segment disease. Therefore, further studies are necessary to overcome difficulties in the future ahead. With astute patient collection an ACMF is a safe operation, giving good outcomes in over 90 %. The advantages of the operation include conservation of the motion segment, direct removal of the compressive abnormality, avoidance for the need for fusion and earlier recovery, no chance of vertebral artery injury.

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