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Insertion of the Peritoneal Catheter During Ventriculoperitoneal and Lumboperitoneal Shunting Procedure

Ventrikülоperitoneal ve Lumboperitoneal Şant Takılması Sırasında Peritoneal Kateterin Yerleştirilmesi

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ABSTRACT

There are several techniques for treatments of hydrocephalus and pseudotumor cerebri. Venticuloperitoneal and lumboperitoneal shunting procedure are one of the treatment alternatives for these diseases. Peritoneal catheter placement is one of the steps during ventriculoperitoneal and lumboperitoneal shunting. We develop a new technique for the placement of the distal catheter. Fourteen patients have undergone this procedure in our clinic. Age range was Between 5 days and 56 years old. Four of them were lumboperitoneal shunting 10 of them were ventriculoperitoneal shunting. 9 patients were followed up 6 months and 5 patients were followed up Between 1 month and 4 months, and, none of them has experienced any catheter obstruction or infection. postoperatively.

Key words: *Hydrocephalus, Peritoneal catheter, shunt*

ÖZET

Hidrosefali ve ve pseudotumor serebri değişik teknikler kullanılarak ameliyat edilmektedir. Ventrikülоperitoneal ve lumboperitoneal şant takılması da bu hastalıklar için mevcut olan tedavi seçenekleridir. Peritoneal kateter yerleştirilmesi ventrikuloperitoneal ve lumboperitoneal şant işlemi sırasında basamaklardan birisidir. Bu çalışmada peritoneal ucun takılması ile ilgili olarak geliştirmiş olduğumuz teknik ve bu teknikle opere edilen hastalarımız sunulmuştur. Toplam 14 hasta bu teknikle opere edilmiştir. Hastaların yaşı beş gün ile 56 yaş arasındaydı. Hastaların dördüne lumboperitoneal şant, on hastaya ise ventrikuloperitoneal şant takılmıştır. Dokuz hasta 6 ay boyunca, beş hasta ise 1 ile 4 ay boyunca takip edilmiştir. Hastaların hiçbirinde kateter tıkanması, infeksiyon problemi ile karşılaşılmadı.

Anahtar Kelimeler: *Hidrosefalus, Peritoneal kateter, Şant*

INTRODUCTION

Ventriculoperitoneal (VP) and lumboperitoneal (LP) shunt procedure are used for the treatment of the hydrocephalus and pseudotumor cerebri, respectively. Periton should be incised during placement of the distal catheter placement for introducing distal catheter into the abdomen through peritoneum. Using trochar for introducing of the distal catheter into abdomen or using endoscopical techniques or open techniques has some complication risk during application of the distal catheter of the VP or LP shunt. Introducing distal catheter into abdomen using any technique in LP shunting procedure is more difficult than VP shunt procedure thanks to lateral decubitis Position in LP shunting. To address these problems, we developed a simple method for distal catheter introducing into abdomen. Our method could be used for both VP and LP shunting.

RESULTS

We have applied this method for distal catheter placement in patients with hydrocephalus and pseudotumor cerebri. There were 14 patients in our series. 4 of them were LP shunt for pseudotumor cerebri and 10 of them were VP shunt for hydrocephalus for different reasons including congenital hydrocephalus, hypothalamic tumor and subarachnoid hemorrhage. 4 of these patients have previous multiple abdominal surgery but no patient has a history of diffuse peritonitis in this study. There were four patients with previous abdominal surgery who has undergone shunting procedure, one of them for LP shunt, three of them for VP shunt without any difficulty. The time needed for the whole operation was ranged from 20 minutes to 35 minutes and for introducing distal catheter was 2-4 minutes. Peritoneum was accessed without difficulty in all patients and distal opening and catheter introducing were accomplished with ease. Patients age range was between 5 days and 56 years old, six of them female 8 of them male. 7 patients were followed up more than 6 months, 4 of them about 3 months and 2 of them about 1 month. During the follow-up period, no catheter obstruction or infection occurred. There has been no mortality or morbidity as a result of this procedure. The hospital stays were from 5 days to 7 days.

Operative Tecnique

After induction of general anesthesia, the patient is placed in supine position and a bolster is placed below the trunk between the shoulder and hip for ensuring slightly deviation of the trunk to the left side, for the placement of VP shunt. The patient is placed in the lateral decubitis position with the right flank upward and a bolster is placed under the left flank to stretch the right flank between the 12th rib and iliac crest for the placement of LP shunt. All procedures are the same for introducing distal catheter after positioning of the patients in LP and VP shunt. Abdomen is incised parallely to the 12th rib and below the 6-12 cm to the 12th rib and 5-7 cm laterally to umbliculus after percussion of liver. Incision length is 3–5 cm, after the incision subcutaneous adipose tissue is dissected from the external part of the tunica vaginalis abdominalis, then external part of the tunica vaginalis abdominalis is incised parallely to the skin incision and muscle tissue is seen and muscle tissue is separated using clamps for reaching internal part of the tunica vaginalis abdominalis. Internal part of the tunica vaginalis abdominalis is identified after dissecting of the muscle tissue. Ecartors are placed at the sides of the incision and all layers are pulled laterally for better visualization. Internal part of the tunica vaginalis abdominalis is circumferentially sutured using 3.0 vicryl as shown in Picture 1c and sutured zone of the internal part of the tunica vaginalis abdominalis is incised with 11 number scalpel about 0.4 cm length and blunt dissector is introduced about 5-8 cm through this incision for feeling of the intraabdominal distance. After the blunt dissection of this

incision , distal catheter is easily inserted through this small incision, then 3.0 vicryl which is placed previously is knotted with around distal tissue for securing the distal catheter (Picture 1a- i). Blocking of the respiration is beneficial during blunt dissection and, introducing of the distal catheter into the abdominal cavity for prevention of the movement of the intestines.

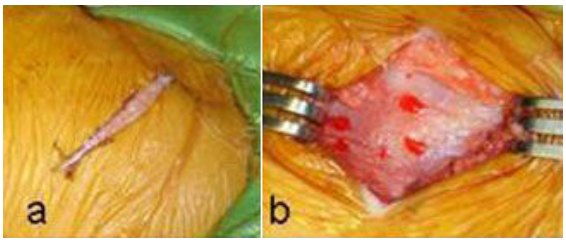

Figure 1a, b: *Abdomen is incised parallely to the 12th rib and below the 6-12 cm to the 12th rib and 5-7 cm laterally to umbliculus after percussion of liver. Incision length is 3–5 cm, after the incision subcutaneous adipose tissue is dissected from the external part of the tunica vaginalis abdominalis.* ***(Warning: Before the procedure, all patient should be examined regarding hepatomegaly)***

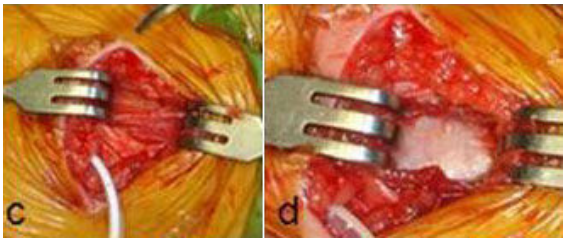

Figure 1c, d: *After incision of the tunica vaginalis abdominalis externalis, the muscle tissue is dissected and superior layer of the tunica vaginalis abdominalis internalis is exposed*

Figure 1e: *We don't try to strip of the inferior surface of the tunica vaginalis internalis from the parietal peritoneum, we make circumferential suturing with 3.0 vicryl on the tunica vaginalis abdominalis internalis, this provides also suturing of the parietal peritoneum. This step is the main modification from the classical way.*

Figure 1f, g: *We make 3 mm length incison at the center of the circumferential suture with the number eleven scalpel, then gently introducing blunt dissector through this incision for reaching into abdominal cavity and separating some adhesion for easy placement of the distal catheter.*

Figure 1h: *Insertion of the peritoneal catheter. Blocking respirator movement around 20-30 seconds during insertion of the peritoneal catheter makes the procedure easier regarding with our experience.*

Figure 1i: *Insertion of the catheter is completed.*

DISCUSSION

As a general rule, shorter period of operation time for shunting procedure has less infection risk than the longer one. Ventriculoatrial shunting, ventriculopleural shunting, retroperitoneal shunting and third ventriculostomy in appropriate cases are used extensively in neurosurgical practice but, third ventriculostomy is beyond the scope of this study. Opening of peritoneum for distal catheter placement is a very common procedure in daily neurosurgical practice. Most neurosurgeons prefer to expose to the peritoneum using trochar and, some neurosurgeons prefer open technique for placement of the distal catheter (1,2,3,4). Each distal catheter settling technique has special complications; such as pleural effusion in ventriculopleural shunting, pulmonary microembolism, pulmonary hypertension, septicemia in ventriculoatrial shunting, viscus perforation while making close technique (using trochar while introducing the catheter into the abdominal wall), herniation of the intestines through the defect from the abdominal wall. Herniaton of the intestines was reported at 17 % in one series in open and closed technique after distal catheter placement (1). The complications which are reported in different studies are not common, but may lead to shunt dysfunction, infection or discomfortable conditions, when they would ocur (2,3,4,5,6). We try to develop modified technique to lessen such type complications and making a shorter period of time operation. Kubo and associates has described retroperitoneal placement for distal catheter during lumboperitoneal shunting (7). Using endoscopic device and CO2 insufflation for expanding retroperitoneum is a more complicated technique than our technique, as well as this technique may harbour more potential complications such as ureter and kidney damage than any distal catheter technique. But this technique may be beneficial for patients who has peritonitis or multiple adhesions in their intestines because of previous diffuse peritonitis. Parietal peritoneum is attached to the abdominal and pelvic walls, this attachment is more firmly behind the linea alba and inferior part of the diaphragm (8). In the present study, we use this anatomical feature of the peritoneum. Instead of stripping of the interior part of abdominal wall from parietal peritoneum as in open technique, we prefer to reach internal part of the tunica vaginalis abdominalis through abdominal skin incision. After skin incision, we separate adipose tissue above to the tunica vaginalis abdominalis externalis and after incision of the tunica vaginalis abdominalis externalis we reach to the muscle tissue and separating to muscle tissue, we reach external part of the tunica vaginalis abdominalis internalis, the internal part of this layer is attached to the parietal peritoneum, in this stage on the contrary to the open technique, we don't try to strip of the inferior surface of the tunica vaginalis internalis from the parietal peritoneum, we make circumferential suturing with 3.0 vicryl on the tunica vaginalis abdominalis internalis, this provides also suturing of the parietal peritoneum, then we make 3 mm length incison at the center of the circumferential suture with the number eleven scalpel, then gently introducing blunt dissector through this incision for reaching into abdominal cavity and separating some adhesion for easy placement of the distal cathteter, blocking respirator movement around 20-30 seconds during insertion of the distal catheter makes the procedure easier regarding with our experience. We did not encounter any difficulty in our lumboperitoneal and ventriculoperitoneal shunt cases, but in one case, we experienced difficulty during insertion of the distal catheter due to respiration which causes intestinal movement, so as to prevent this difficulty we prefer to introduce the distal catheter during blocking of the respiration. In our presented technique, no need any extra equipment, and any extra procedure such as endoscopic devices or CO2 insufflation and familiarity of the neurosurgeons who prefer to insert the distal catheter with

open technique makes this technique easier than the other techniques, but it may be disadvantageous in cases with diffuse peritonitis because of extensive peritoneal adhesions.

CONCLUSION

We have developed a new method for placement of the peritoneal catheter for both venticuloperitoneal and lumboperitoneal shunting procedure. This method is easily applicable and there is no need for any extra equipment and procedure. This technique may be used even in cases with multiple abdominal operations but no with diffuse peritonitis, but in cases with diffuse peritonitis alternative distal catheter placement methods could be used.

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