# Rex-Shunt'ında İnternal Jugular Ven Grefti Yerine Umbilikal Ven Transpozisyonunun Kullanıldığı Alternatif Bir Çözüm: Morfolojik Bir Çalışma

**Ayşenur Celayir[1], Sinan Celayir[2], Serdar Sander[3], Güler Kahraman[4], Sergülen Dervişoğlu[5]**

[1]Zeynep Kamil Kadın Ve Çocuk Hastalıkları Eğitim Ve Araştırma Hastanesi, Çocuk Ccerrahisi Kliniği, İstanbul, Türkiye

[2]İ. Ü. Cerrahpaşa Tıp Fakültesi, Çocuk Cerrahisi Anabilim Dalı, İstanbul, Türkiye

[3]Bakırköy Anne Ve Çocuk Hastanesi, Çocuk Cerrahisi Kliniği,istanbul, Türkiye

[4]İ. Ü. Cerrahpaşa Tıp Fakültesi, Anatomi Anabilim Dalı, İstanbul, Türkiye

[5]İ. Ü. Cerrahpaşa Tıp Fakültesi, Patoloji Anabilim Dalı, İstanbul, Türkiye

**Yazışma Adresi :** Şakacı Sok. Mehmet Sayman Ap.77-8 Kazasker, Kadıköy, İSTANBUL 34736 İSTANBUL - Türkiye

İş Tel: 0216 343 20 73 Cep Tel: 0532 326 56 69 **e-mail:** acelayir@ttnet.net.tr

## *ÖZET:*

***Giriş ve Amaç:*** *Rex-Shunt operasyonu, ekstrahepatik portal ven tromboz olgularında ümit verici bir tedavi seçeneği olarak görülmektedir. Umbilikal ven transpozisyonu, İnternal juguler ven grefti yerine lümen çapı yeterli kabul edilebilir otogen materyal olarak portal ven açıklığını sağlayabilir. Bu çalışmanın amacı rex-shunt ameliyatında bypass olarak bir hipotez olan umbilikal ven transpozisyonunun kullanılabilirliğini göstermektir.*

***Materyal ve Metod:*** *6 erişkin otopside umbilikal ven açıklığını saptamak için bir ön çalışma yapıldı. Umblikal venin uzunluğu, görünümü ve anatomik lokalizasyonları kaydedildi. Umbilikal ven örnekleri aynı zamanda lümen açıklığı açısından histopatolojik olarak incelendi. Ayrıca üst abdominal laparotomi geçiren yedi çocuktan alınan umbilikal ven örneklerinin lüman açıklıkları ve histopatolojik özellikleri incelendi.*

***Bulgular:*** *Erişkin otopsilerinde umbilikal ven makroskopik olarak çok ince ve lümen açıklıkları histopatolojik olarak kapalı bulundu. Halbuki çocuklardaki ameliyat bulgularında erişkin otopsilerinin aksine umbilikal ven lümenleri makroskopik olarak açık ve iç çapları daha geniş bulundu. Özellikle yenidoğanlarda lümen tam açıktı, çocuk büyüdükçe lümen kontrakte olmaktaydı. Rex shunt ameliyatlarında umbilikal ven transpozisyonu yapılırken Doppler ve akım ölçümleri ile umbilikal venin kullanılabilirliği ölçülebilir.*

***Tartışma:*** *İlk ön çalışmalarımızın ışığında umbilikal venin çocuklarda açık bulunduğu ve daha önce kullanılmadıysa Rex shunt ameliyatlarında kullanılabileceği söylenebilir. Yinede alternatif bir teknik olduğunu söylemeden önce bu konuda ilave deneysel araştırmalar yapılması uygundur.*

***Anahtar Kelimeler:*** *Rex-shunt, portal hipertansiyon, umbilikal ven*

## *SUMMARY:*

***An alternative solution for Rex-Shunt by using Umbilical Vein Transposition instead of İnternal Jugular Vein graft: A morphological study***

***Background and Aim:*** *Improvement in outcome of portal vein thrombosis was seen with the introduction of new promising treatment modalities to extra-hepatic portal vein thrombosis, like Rex-shunt. Using the umbilical vein instead to internal jugular vein has a readily accessible autogenous vein of adequate caliber that can maintain patency rigorous conditions. The aim of this study is to demonstrate the feasibility of the using of umbilical vein for mesenterico-umbilical venous shunts as a hypothetical technique.*

***Material and Method:*** *A preliminary study was done to investigate the patency of the umbilical vein in 6 adult autopsies. The length, appearance and anatomic localizations were noted. The umbilical vein specimens were also investigated histopathologicaly in regard to the lumen patency. Additionally the umbilical veins of 7 children who underwent upper laparatomy were also examined for the patency in the same way.*

***Results:*** *In adult autopsies the umbilical vein was macroscopically very thin and the lumens were also found occluded histopathologicaly in all. However the operational findings in children were not corresponding with the adult autopsy findings, showing macroscopically open lumens, which also had longer internal diameter. Especially in newborn patients the lumens were found full open. In older children the lumens were also found open but contracted. For clinical use the flow within the umbilical vein should be measured with preoperative or with an intra-operative Doppler and flow probe in rex-shunt operations.*

***Conclusion:*** *In the light of these preliminary findings we assume the use of mesenterico-umbilical venous shunts in those instances of extra-hepatic portal hypertension, in which umbilical vein were found open and not used previously in other operations. However we think that additional experimental studies and operative observations might be very helpful before stating this technique as an alternative.*

***Key Words:*** *Rex-shunt, portal hypertension, umbilical vein*

## INTRODUCTION

With the introduction of new promising treatment modalities to extra-hepatic portal vein thrombosis, like Rex-Shunt and improvement in outcome of portal vein thrombosis, mesenterico-umbilical vein anastomosis may represent a sound alternative with patients of portal hypertension (1, 2). Using of internal jugular vein graft has high morbidity. However the umbilical vein has a readily accessible autogenous vein of adequate caliber that can maintain patency rigorous conditions. Its use can be an alternative solution in constructing mesenterico-umbilical venous shunts in those instances of extra-hepatic portal hypertension in which umbilical vein is not used previously in other operations (3). The aim of the study is to investigate the patency of the umbilical vein in children and adults. A morphological study is planned and adult autopsies and additionally the umbilical veins of children who underwent upper laparatomy were examined for patency in regard to examine the feasibility of the using of umbilical vein in portal hypertension patients, for the use of a mesenterico-umbilical venous shunt.

## MATERIAL AND METHODS

The umbilical veins of 6 adult autopsies and umbilical vein specimens from 7 operated children were examined and the length, appearance and anatomic localizations were noted. The umbilical vein specimens were also investigated histopathologicaly in regard to the lumen patency. Additionally the umbilical veins of 2 newborns and 5 older children who underwent upper laparatomy were also examined for the patency and internal diameter macroscopically and microscopically with Hematoksilen-Eosin staining. The ethical committee approved the study.

## TECHNICAL INNOVATION OF THE NEW METHOD

A vein graft is procured usually from the internal jugular vein in Rex-Shunt operation. In this new technique, chosen graft is umbilical vein. If the intra-hepatic portal vein is adequate, the superior mesenteric vein is then exposed below the transverse mesocolon. The anastomosis could be created between abdominal wall tip of umbilical vein and the superior mesenteric vein at the beginning of the portal vein (3).

Umbilical vein is divided at its junction with abdominal wall. After the umbilical lumen reopened with a style, the patency of umbilical vein should be confirmed via venogram in the beginning of vein anastomosis, and is brought around the back or in front of the antro-pyloric region (according to the best positioning) and then through the transverse mesocolon toward the superior mesenteric vein, where it is implanted terminolaterally **(Fig.1)**. Flow within the umbilical vein could be measured with an intra-operative Doppler and flow probe (3).

## RESULTS

**Figure.1:** Diagram of the mesenterico-umbilical anastomosis for portal bypass.

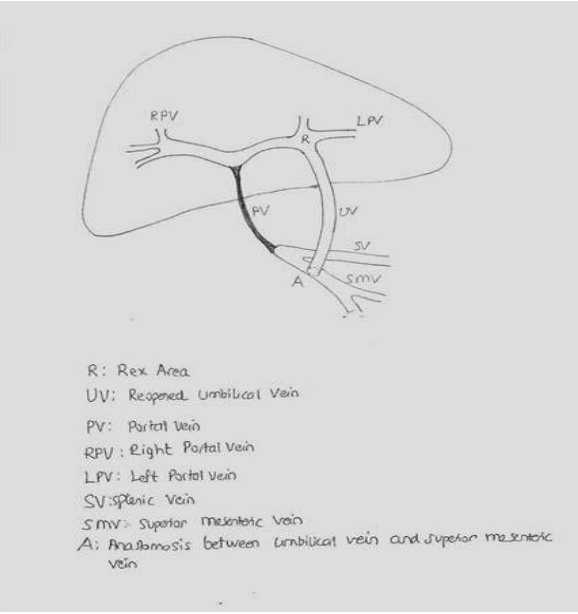


**Table 1:** Autopsy findings

| | Sex | External Diameter (mm) | Length (cm) | Histopathology |
|---|---|---|---|---|
| Case 1 | Male | 3 | 10.5 | Fibrotic, occluded |
| Case 2 | Male | 2 | 9.5 | Fibrotic, occluded |
| Case 3 | Male | 3 | 11.4 | Fibrotic, occluded |
| Case 4 | Female | 2 | 11.0 | Fibrotic, occluded |
| Case 5 | Male | 3 | 15.6 | Fibrotic, occluded |
| Case 6 | Male | 3 | 18.2 | Fibrotic, occluded |

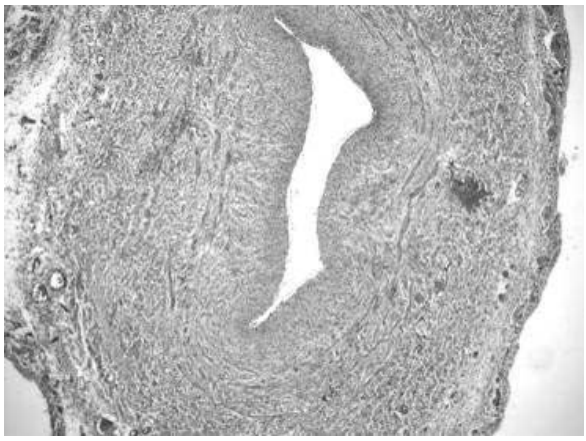
**Fig 2:** Samples of autopsy dissections

**Case 1:** **Case 3:** **Case 4:**

**Table 2:** Operation and histopathology findings: The removed part of the umbilical veins were opened and examined for patency during the operation and send to histopathology for further investigation.

| | Sex, Age | External Diameter (mm) | Histopathology |
|---|---|---|---|
| Case 1 | M, 3/365 | 5 | Open |
| Case 2 | M, 6/365 | 6 | Open |
| Case 3 | M, 2y | 6 | Open / Collapsed |
| Case 4 | M, 2y | 4 | Open / Collapsed |
| Case 5 | K, 2.5y | 4 | Open / Collapsed |
| Case 6 | M, 2.5y | 4 | Open / Collapsed |
| Case 7 | M, 6y | 4 | Open / Collapsed |

**Fig 3:** Sample of histopathology (Hemotoksilen – Eosin light microscopy was used for the examination)



**Case 1:** Open lumen (HE*200)

## DISCUSSION

Decompressing of extra-hepatic portal hypertension by directly bypassing the portal vein thrombosis has been reported in case of children with idiopathic portal vein obstruction by de Ville de Goyet (4). The portal vein in the fissure between the medial and lateral segments of the left lobe is accessible after the division of the liver bridge between segments 3 and 4. This part of the portal vein generally is intact and is separated the changes after thrombosis that may have occurred in the main trunk of the portal vein. Furthermore, this area generally is not involved with the cavernous transformation that may occur after thrombosis and recanalisation. In a second report, de Ville de Goyet et al, described the experience in the application of this technique in reconstituting portal venous flow to the liver in non-transplant patients (5).Experiences with the applications of the Rex-Shunt in children with symptomatic portal vein obstruction have been excellent (6). The Rex-Shunt has proven to be an affective method of resolving portal hypertension caused by extra-hepatic portal vein thrombosis including thrombosis after living donor transplantation (4, 5, 6).In our study we found that the umbilical vein was macroscopically very thin in all adult autopsy cases. These lumens were also found occluded histopathologically. However the operational findings in children were not corresponding with the adults, showing macroscopically open lumens, which were also had longer internal diameter. According to these findings using the umbilical vein in children is more justified than in adults. However although rare, umbilical vein and ductus venosus were reported as open in adult patients (7). In such cases these shunt operation can be one of the options. Why the umbilical vein (if it is intact) is used as shunt material instead of internal jugulary vein? We know that umbilical vein obliterated after three-mount old age but its lumen is patent (8), and the patency of the umbilical vein is also demonstrated in intra-abdominal operations done via supra-umbilical incisions (3). Additionally umbilical vein had been devised in a number of arterializations methods for portal hypertension in previous years. Side to end anastomosis between the right gastroepiploic artery and the reopened umbilical vein, or end to end anastomosis between the splenic artery and reopened umbilical vein have been formed, Adamson's had reviewed much of the literature and had reported a personal series of 32 cases. The only reported experience

since Adamson's review was that described by Otte (9). In these arterialisation methods, after using of the umbilical vein as a shunt, umbilical vein was found competent (9,10). At last, a congenital native bypass via umbilical vein was determined in a patient with an in-utero portal vein obstruction. Congenital anomalies of the portal and umbilical venous system are rare, with few reported cases. A native umbilical vein had acquired mesenteric venous out flow to bypass an in-utero portal vein obstruction and restore normal venous return to the liver (11). This is an analogue to the recently described Rex-Shunt. This is also an analogue to the new described technique. However, because there is no documented experience with this operation, it is still a clearly experimental technique. Additionally, related to the function in the prenatal period, the arterial nature of the umbilical vein should also be encountered in this technique (3). This new operative technique, like other procedures currently in vogue, is predicated on the concept that the maintenance of liver blood flow is beneficial and should reduce the risk of liver failure and improve long-term survival. This technique allows bypassing the thrombosed portion of the portal vein but avoiding dissection of the jugularis internal vein and related intra-operative risk (3). Furthermore; because of only one anastomosis between umbilical vein and mesenteric vein, operating time and morbidity related with anastomosis will be decreased (3).

**Conclusion:** We think that additional experimental studies are required to validate this theory. For the future use of umbilical vein, operative observations might also be very helpful to have a scientific description and a definite recommendation of this technique as an alternative.

## *REFERENCES*

*1. Dasgupta R, Roberts E, Superina RA, Kim PC. Effectiveness of Rex-shunt in the treatment of portal hypertension. J Pediatr Surg 41(1): 108-12, discussion 108-12, 2006.*

*2. Ates O, Hakguder G, Olguner M, Akgur FM. Extrahepatic portal hypertension treated by anastomosing inferior mesenteric vein to left portal vein at Rex recessus. J Pediatr Surg 38(10): 10-11, 2003.*

*3. Cerrah Celayir A. A new hipothesis about the rex-shunt operation: using of umblical vein transpozition instead of intestinal jugulary vein graft Zeynep Kamil Tıp Bülteni, 37(4): - - -, 2006.*

*4. de Ville de Goyet J, Gibbs P, Clapuyt P, et al: Original extrahilar approach for hepatic portal revascularizasyon and relief of extrahepatic portal hypertension related to later portal vein thrombosis after pediatric liver transplantation: Long term results. Transplantation 62: 71-75, 1996*

*5. de Ville de Goyet J, Alberti D, Clapuyt B, et al: Direct bypassing of extrahepatic portal venous obstruction in children: A new technique for combined hepatic portal revascularization and treatment of extrahepatic portal hypertension. J Pediatr Surg 33: 597-601, 1998*

*6. Bambini DA, Superina R, Almond PS, et al: Experience with the Rex Shunt (mesenterico-left portal bypass) in children with extrahepatic portal hypertension. J Pediatr Surg 35: 13-19, 2000*

*7. Yoshimoto Y, Shimizu R, Saeki T, Harada T, Sugio Y, Nomura S, Tanaka H. Patent Ductus Venosus in Children: A Case Report and Review of the Literature. J Pediatr Surg 39(1): 1-5, 2004*

*8. Moore KL. Fetal and neonatal circulation in the developing human. Clinical oriented embryology. (4th Ed) WB Saunders Company, pp: 321-330, 1998*

*9. Otte JB, Reynaert M, de Hemptine B, et al: Arterialization of the portal vein in conjunction with a therapeutic portacaval shunts: Hemodynamic investigations and results in 75 patients. Ann Surg 196: 656-663, 1982*

*10. Adamsons RJ: Arterialization of the portal vein: Techniques and results. In Rutherford RB (ed.): Vascular surgery, 2nd ed., Philadelphia, WB Saunders, pp: 1061-1070, 1984*

*11. Rahman N. Al-Nassr S, Davenport M. Congenital mesenterico-portal (Rex) shunt. Pediatr Surg Int 18: 514-516, 2002*

**2007 EUPSA, Torino' da poster olarak sunulmuştur.**