



# Continuous saline irrigation during video-assisted liver transection: The 'Waterfall' technique

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## ABSTRACT

The use of a sealing device during video-assisted liver transection has gained a lot of popularity due to its advantages in operative and patient outcomes. However, it has some technical problems including tissue debris sticking to the instrument, excessive smoke production, and loss of pneumoperitoneum from suction. Herein, we describe a novel 'Waterfall' technique that uses continuous irrigation of saline directly on the transection plane. This technique washes away tissue particles and smoke, clears the operative view, and improves the effectiveness of tissue sealing.

**Keywords:** Hepatectomy, laparoscopic, liver transection, sealing device, video-assisted

Video link: <https://turkjsurg.com/img/UCD-6143-V1.mp4>



## INTRODUCTION

Video-assisted surgery has gained considerable momentum in all fields of surgery, including liver resection. Liver transection using a sealing device provides many advantages, including shorter operative time, decreased blood loss, and fewer complications (1). However, using a sealing device in video-assisted liver surgery has some technical problems including tissue debris sticking to the jaw of the device that requires frequent cleaning and reinsertion, excessive smoke production leading to a blurring of the camera, and excessive suction inducing loss of pneumoperitoneum which leads to more bleeding. Herein, it was aimed to describe a technique using continuous saline irrigation during video-assisted liver transection to mitigate these problems.

## Operative Technique

In this demonstrated case, we performed a laparoscopic left hepatectomy. The patient was lying in the French position. Five ports were used for this operation, which included three 11 mm and two 5 mm ports. After confirming resectability, the vascular inflow and outflow of the left lobe of the liver were individually controlled using a combination of a Foley catheter and an endo-mini retractor, which was described by our team (2). The planned transection plane was marked along the ischemic demarcation line that appeared. During liver transection, the operating surgeon uses a sealing device in the main hand and a suction-irrigation instrument in another. The sealing device acted as a clamp-crushing instrument for dividing the liver parenchyma while saline was continuously irrigated directly into the transection plane. A three-way connector is used for controlling the flow of water. Blood vessels or pedicles that are smaller than 7 mm were sealed securely using the sealing device. All bleeding points were first clearly visualized by irrigation, then secured using bi- or mono-polar cauterization. The main structures, which were the left hepatic duct and left hepatic vein, were individually secured using linear staplers.

## DISCUSSION

In this paper, we proposed a novel and simple 'Waterfall' technique to overcome common problems when using a sealing device during video-assisted liver transection.

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Continuous irrigation of saline washes away the cauterized tissue-particles from the jaw of the device and the transection plane, which in turn reduces the amount of smoke produced. This provided a clearer surgical field that requires less suctioning and reduces the number of times the device has to be removed for cleansing. The use of warm saline stabilizes intraabdominal temperature and prevents blurring of the camera lens. The incorporation of a three-way connector allows for more precise control of water flow and prevents splashing of water into the camera lens.

Better bleeding control could also be achieved with this technique. Firstly, having a flow of water on the transection plane enhances the bipolar function of the sealing device by acting as an electric current conduction media and provides a thermoprotective effect on the tissue (3). Secondly, this technique washes away the blood from the cut surface and aids in pinpointing the bleeding spot that needs to be sealed. Additionally, unlike the use of suction devices that would typically cause a loss of pneumoperitoneum and worsen the bleeding, saline irrigation helps maintain a high intraabdominal pressure.

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## VIDEO MAKALE-ÖZET

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## Video yardımcı karaciğer transeksiyonu sırasında sürekli salin irrigasyonu: 'Şelale' tekniği

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### ÖZET

Video yardımcı karaciğer transeksiyonu sırasında sızdırmazlık cihazı kullanımı, ameliyat ve hasta sonuçlarındaki avantajları nedeniyle oldukça popülerlik kazanmıştır. Bununla birlikte, alete yapışan doku artıkları, aşırı duman üretimi ve emme nedeniyle pnömoperiton kaybı gibi bazı teknik sorunları vardır. Bu yazıda, doğrudan transeksiyon düzleminde sürekli salin irrigasyonu kullanan yeni bir 'şelale' tekniği tanımladık. Bu teknik doku partiküllerini ve dumanı yıkayarak uzaklaştırır, operatif görüşü temizler ve doku sızdırmazlığının etkinliğini artırır.

**Anahtar Kelimeler:** Hepatektomi, laparoskopik, karaciğer transeksiyonu, sızdırmazlık cihazı, video yardımcı

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