# Duodenal Stump Blow Out From Reinforced Stapled Lines

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**Abstract**

Stapling has improved the techniques of surgical anastomoses greatly. It shortens operative time and makes difficult anastomoses easier in some remote cavities. Apart from greater expenses as compared to conventional sutures, the other downside of staples is the occasional need to reinforce the stapled lines especially to secure hemostasis. This is usually done by continuous under-running of a small monofilament sutures on the staple lines. This technique of suturing is theoretically reasonable in achieving the aim of hemostasis by virtue of its strangulating effect on the exposed bleeding vessels as compared to the other method of mattressing continuously either vertical or horizontal as a second layer and thus hiding the stapled lines.

## SHORT COMMUNICATIONS

Stapling has improved the techniques of surgical anastomoses greatly. It shortens operative time and makes difficult anastomoses easier in some remote cavities. Apart from greater expenses as compared to conventional sutures, the other downside of staples is the occasional need to reinforce the stapled lines especially to secure hemostasis. This is usually done by continuous under-running of a small monofilament sutures on the staple lines. This technique of suturing is theoretically reasonable in achieving the aim of hemostasis by virtue of its strangulating effect on the exposed bleeding vessels as compared to the other method of mattressing continuously either vertical or horizontal as a second layer and thus hiding the stapled lines.

However, not all bowels are the same in terms of its propensity to bleed at the stapled lines and potentiality to leak. From numerous clinical observations, transections of the jejunum and ileum with staples would give rise to a potentially bleeding stapled lines. On the contrary, stapled lines of a duodenal stump not only has a tendency to bleed, but instead has a risk of blow out like any other forms of duodenal stump closure([1]). This risk of leakage is compounded by tissue edema from the reduction in intravascular oncotic pressure following massive exudative protein loss in hepatoduodenal ligament dissection of the lymph nodes during a procedure such as a radical gastrectomy (D3). Similar exudative situations would be any degree of dissections in the splanchnic bed on the background of cirrhotic liver and portal hypertension. In fact, it is not uncommon to find a cirrhotic patient with concomitant gastric cancer requiring a radical D3 gastrectomy especially in the Far East where Hepatitis B is endemic and gastric cancer is common. Radical lymphadenectomy of the splanchnic lymphatic network on the background of portal hypertension would result in physiologically significant exudates ([2]). The other common clinical scenario with potential massive exudative loss is parenchymal liver dissections (hepatotomy or hepatectomy) on cirrhotic livers. Although liver resections are uncommon in cirrhotics because of the usual advanced stages of primary liver cancers discovered, coupled with concomitant poor liver functions, the “ultra” high bilio-digestive bypasses for unresectable biliary tumors beyond the hepatic ducts confluence requiring hepatotomy is not rare. Apart from liver transections, these bypasses would entail a tenuous hepatico - or cholangiojejunostomy and a jejuno-jejunostomy for small bowel reconstitutions. All the bypasses are quite often performed by side-to-side anastomoses leaving the proximal stumps with stapled lines free. This stapled lines should be buried with a layer of mattress sutures forming a second layer of the anastomoses to prevent overt anastomotic leak in the event of stapled lines failure .

Perfect duodenal stump management has been the obsession of general (abdominal) surgeons for a long time and debates on the best methods of securing a safe stump have not really settled ([3]). Although most staplers would produce at least two or three rows of staples, burying this line with a “second” layer using monofilament sutures placed in a vertical or horizontal mattress either continuously or interrupted is prudent to consolidate the duodenal stump and averting the blow out in case the stapled line gives way especially at the edges on the lateral side. It is known for a long time that after partial gastrectomy and reconstruction, the edge of the anastomotic line on the lesser curvature side is prone to leakage. It is not known whether the same potentiality exists on the duodenum along the same curvature line after duodenal transection. The vascularity of the duodenal C-loop is enriched by both the anterior and posterior pancreaticoduodenal arteries (forming an arcade on both sides of the duodeno-mesenteric junctions) arising from both gastroduodenal and superior mesenteric arteries ([4]). The duodenal transection is usually made at a convenient point at the distal first part or the proximal second part of the duodenum.

The orientation of the stapler is placed arbitrarily either parallel or across the directions of the two arcades. The parallel orientation of the staple line to the vascular arcades could theoretically ensure the same duodenal vascularity is maintained after transection. On the contrary, transverse orientation of staple line might predispose one of the edges to hypovascularity and hence greater susceptibility to leakage. If the axis of the lesser curvature of the stomach is a natural hypovascular line, then the anatomical distal continuum would incude the lateral border of the duodenal C-loop. This vascular watershed is perhaps exarcebated in the transverse duodenal transection. The weakest point would perceptibly be at the confluent of the lateral edge of the transverse stapled line and the above axis. This might explain the anecdotal observation of “punctate” duodenal stump blow out at the lateral edge of the transverse duodenal stump staple line ([5]). Seemingly, this punctate lateral edge is not spared from the risk of leak even if a continuous under-running suture is inserted along the stapled line. Hence, the duodenal staple line is perhaps best reinforced with a second layer of either continuous or interrupted mattress rather than over and over running sutures resulting in a buried (first layer) stapled line. It is the authors opinion based on the above observations that the prevention of anastomotic leakage takes precedent over avoidance of stapled line bleeding in duodenal stump closure using linear metallic staples. This is especially crucial in patients with conditions that are prone to tissue edema as mentioned above.

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