Editorial

Esophagectomy: Anastomotic Leak, Stent the Rent!

Metrics of surgical outcomes have shifted to right from being mortality-morbidity (MM) centered to 'patient reported outcomes' based.[1] Surgeons now aim for "never events" by inculcating "zero tolerance" to adverse events.[2] Esophagectomy related MM continues to haunt us, despite better anatomical understanding, anesthesia, antibiotics,[3] patient selection tools, staging modalities, pre-operative optimization of patient risk factors, neoadjuvant chemo-radiotherapy protocols, surgical techniques and post-operative care.

Esophageal malignancy, having a poor 5-year survival (<15%), has moved from being the 9th most common cancer to 8th most common[4,5] The MM of esophagectomy, the "gold standard" treatment, is mainly attributable to anastomotic leak (AL). A < 10% mortality can be improved further, since 90% of 30 day mortality is AL driven. The concerns are much worse owing to suspect, immethodical, heterogeneous and inconsistent reporting.[6] The mortality increases three-fold with the currently advocated 90 days protocol.[7] Even adequately managed AL leads to reduced disease free and cancer specific survival and defeats palliation due to accelerated fibrosis (40% stricture).[8] The concerns mandate that any innovation addressing AL should be pursued vigorously with due scientific scrutiny.

Surgeons are familiar with leaks, but the esophagectomy AL is not only more likely, but more dreaded. Surgical complexity, distinct esophageal anatomy (absent serosa, fragile longitudinal myofibrillar architecture), extensive anatomical transgression, trans-compartmental anastomosis (bringing the anastomotic conduit from the abdomen to the thorax) and ischemia (travelled length dependent drop in the tissue oxygen tension in the pulled up viscera) contribute to AL.

The anatomical transgression is necessary for the mandatory onco-harvesting of abdominal lymphatic watershed (paracardial, lesser sac, left gastric artery, celiac, common hepatic and splenic artery lymph nodes) along with en bloc thoracic resection (That includes the thoracic duct, azygos vein, ipsilateral pleura, posterior mediastinal paraesophageal tissue, lower-middle mediastinal, subcarinal and right paratracheal lymph nodes) and aortopulmonary window nodes dissection (left paratracheal ones if enlarged dissected separately).

Anatomical site of anastomosis has its own implication. Intra-thoracic anastomosis leak causes mediastinitis, the fear of which tempts us to opt for cervical anastomosis. However, even the cervical leak has a substantial risk of intra-thoracic sequel apart from being more prone to leak and potentially injurious to recurrent laryngeal nerve. The risk of mediastinitis may be reduced by limiting the cervical remnant length to 2 cm.

Anastomotic integrity was thought to be dependent on many other factors. But, the technique, whether hand sewn or stapled, approach whether conventional or minimally invasive and neo-adjuvant chemo-radiotherapy, do not seem to affect the incidence of AL. Tortuous anterior mediastinal navigation leads to venous congestion hence compromised vascularity. Posterior mediastinal approach is favored as it facilitates en bloc lymphadenectomy, which has an impact on survival.

Given the limitation to pre-empt AL, it is important to achieve preoperative optimization of risk factors (e.g. male gender, smoking/alcohol abuse, higher anesthesia risk grades, obesity, prolonged operative time, low albumin levels, quantity of operative blood loss and use of vasopressor) and be anticipatorily proactive lest an AL is missed. Suspicion of AL should lead to query about vascularity, sepsis, size of leak, adequacy of drainage and possibility of conduit necrosis which is distinct from AL.

Almost 50% leaks may remain silent; hence a high index of anticipation in those with risk factors, a high level of suspicion in all and a subnormal threshold for diagnostic intervention should be the norm. Apart from clinical monitoring a meticulous wound (cervical, thoracic, abdominal) assessment along with drain fluid characterization should be followed. Tachycardia may be a non-specific sign, but a new onset atrial fibrillation in a previously healthy rhythmic heart warrants immediate perusal of AL. White cell count (WCC), C-reactive protein (CRP) and procalcitonin levels though helpful are not specific for AL. If suspected, contrast based computed tomography (for anatomical information) and contrast enhanced endoscopy (for assessing vascularity) remain the gold standard.[9]

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Many scoring systems have been suggested to predict AL. The POSSUM (physiologic and operative severity score for the enumeration of mortality and morbidity) score, given its many postoperative variables (lymph node status and number of surgical interventions in 30 days) is inapplicable. A predictive system that assesses the extent of physiological insult versus patient's physiological reserve has been published.[10] The score named EPASS (estimation of physiological ability and surgical stress) incorporates pre-operative risk scores (age, severity of heart disease, pulmonary status, diabetes mellitus, performance status index 'American Society of Anesthesiologists' anesthesia grade) and surgical stress scores (blood loss/body weight, operation duration, extent of skin incision). A less cumbersome score (cut-off 10), incorporating the albumin, CRP and WCC on 4th post-operative day, has been recently published.[8] The score = 11.3894 (0.005 × CRP) + (WCC × 0.186) – (0.174 × albumin).

The basic principles of AL management are resuscitation, control of sepsis, adequate drainage and assessment of anastomotic viability. Conservative management with avoiding oral feeds, antibiotics and delivery of nutrition through nasojejunal tube/jejunostomy are helpful in some.

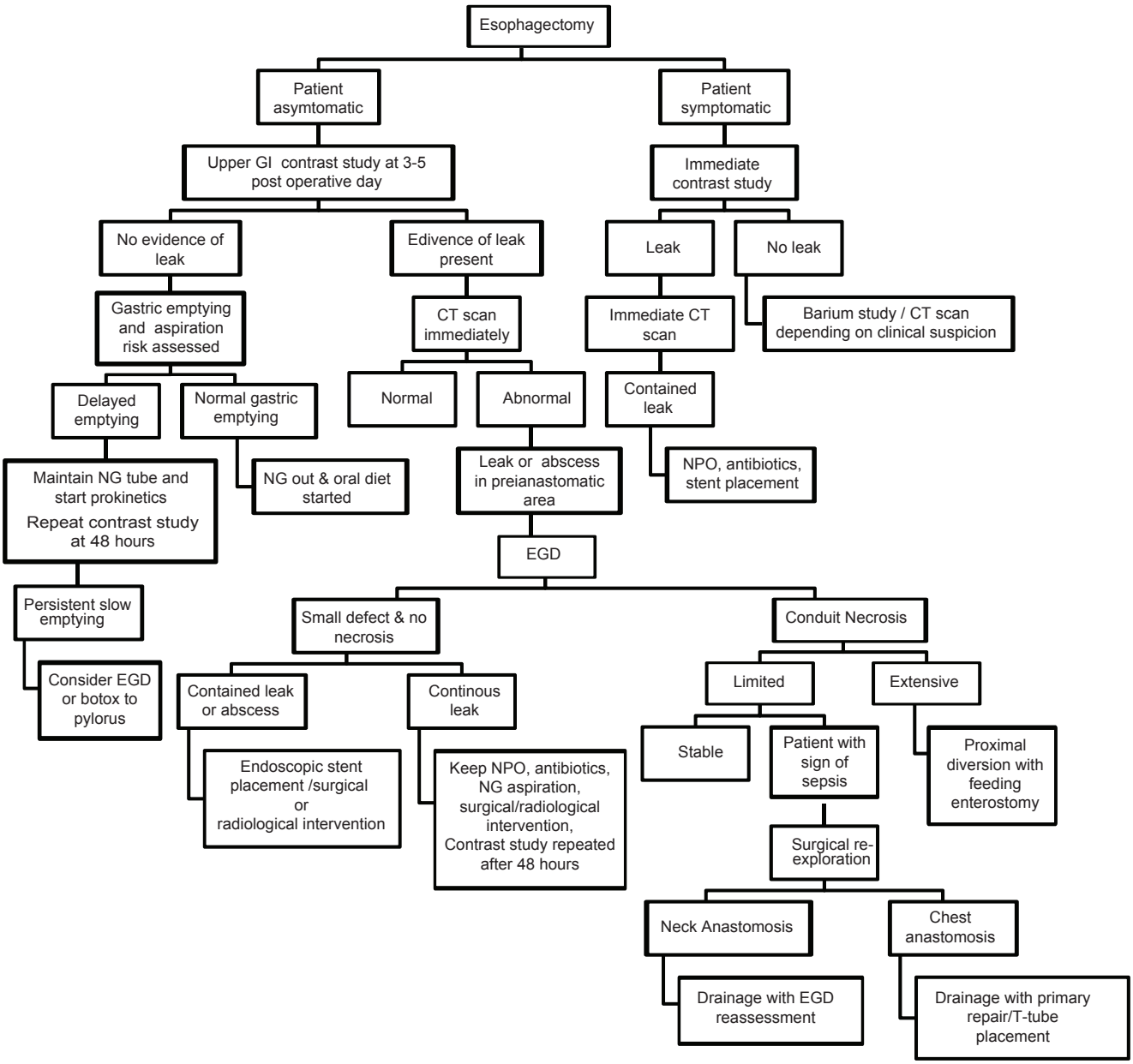

Figure 1: Management algorithm

Small well localized leaks may be treated by endoscopic clips/fibrin glue etc., or a Tuebingen developed over the scope – clip technique. Endoscopic vacuum-assisted therapy, alone or in combination, too has been described. When these measures don't suffice, standard surgical options remain available.

Since AL is an adverse outcome of complex high-risk surgery, compounded by already compromised physiology, a multi-disciplinary team approach in management is desirable. Developments in technology like imaging, endo-optics, prosthetic (stent) materials, stent designs and architecture have harmonized the synergy of multi-disciplinary team approach. These developments have led to "prosthetic stents" being reported as successful in the management of AL.[11] Given the emerging demographic/epidemiological challenges of the disease and supremacy of surgery in its management with its attendant complexity, any data about its surgical outcomes is a potential reference for future surgical developments. The current study[12] is thus relevant despite some reservations, as an ideal study design of "prospective controlled study" is difficult to come by even from the most high volume centers. The study reports success with stenting in 67% of AL, which could be higher and closer to published rates (>90%)[11] had they not excluded the <1 cm leaks arbitrarily, as small. A leak is a leak, howsoever small, as it leads to potentially disastrous changes, which can be pre-empted by its sealing.

Though promising the stenting of AL has its own concerns such as migration (3-40%), blockage (almost 10%), fistulization, disintegration and perforation. All these lead to failure and the need for possible re-stenting. Re-stenting up to 4 times (Mean 1.7) has been reported.[11] Apart from stent failure, stent related complications are as high as 28% as per the largest study reported in the citing literature.[11] Stent migration, the most common complication, has been attributed to suboptimal diameter and intrinsic muscular activity. It remains unmitigated by the use of fixating clips. Since the leak deployed stents have to be retrieved; only the fully covered ones are used as also reported in the present study. The fully covered stents suffer due to lack of grip, given the absence of uncovered shoulders. The "stent to discharge" hospitalization of up to 137 days (mean 25 days) as reported in the present study is a reflection on stent commissioning that could have been potentially optimized .

Stenting the rent is quite promising when used appropriately. The progress in management of AL with nonsurgical, less invasive approaches like stent, is a welcome move towards making the "never events" out of 'adverse events'. The management strategies in AL may herald a paradigm shift, but the clinical approach and decision making will continue to be guided by the accumulated wisdom, as is aptly described in a meticulous algorithm [Figure 1] by Low.[13] Any shift in management strategy would entail sifting through the same.

The innovative spirit of the surgeon scientist continues to challenge the limitations. A recent study is reflective of that spirit.[14] The study showed that the healing of AL can be expedited by recombinant human vascular endothelium growth factor (VEGF) transfection of the gastric conduit. The VEGF is delivered by direct injection of a plasmid-based non-viral system. This leads to enhanced VEGF transcription at the anastomotic site without any systemic VEGF up-regulation. The AL, the Achilles heel of a very precise surgery raises a question with many answers, but a question that begs an answer, the answer then begs the question.

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