NARRATIVE REVIEW

From Morbidity & Mortality To Textbook Outcomes – The Evolution Of Quality Assessment In Liver Surgery: Perspective From Pakistan

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Abstract

Traditional quality assessment after liver surgery has focused on individual outcomes, such as morbidity, mortality, length of hospital stay, and readmission rates. Textbook outcomes in liver surgery is a novel concept comprising a composite measure that incorporates multiple perioperative parameters to achieve the most desirable surgical outcomes as a single indicator. It provides holistic perspective and includes multiple facets involving patient care. Liver surgery is a distinct specialty of gastrointestinal surgery, where traditional postoperative outcome tools may not address the hepatectomy-specific complications. Multifaceted care in liver surgery requires specific outcome parameters that can provide procedure specific information to ensure quality assurance and patient safety. Textbook outcome for liver surgery was put together through modified Delphi method between July 2020 and October 2021, and is the established outcome assessment tool. The current review was planned to evaluate the concept of textbook outcome in liver surgery, and discuss its application in the context of Pakistan.

Keywords: Liver surgery, Textbook outcomes, Patients safety.

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Introduction

Healthcare systems use postoperative outcome metrics as indicators of quality assurance and patient safety after surgical procedures.[1] The routinely used indices for quality reporting include mortality and morbidity rates, as described using Clavien-Dindo classification (CDC) or Comprehensive Complication Index (CCI), length of hospital stay(LOS), readmission rate and failure to rescue. However, these indicators usually reflect single outcome parameter, and do not necessarily provide insight into the multidimensional surgical care.[2] Moreover, the event rate of single matrix can be low which can decrease the discriminating impact to detect differences, thus, affecting the quality improvement process and surgical care.[3] Meaningful reporting and transparency are needed by both patients and hospitals to share the outcomes of performed surgical procedures.

Kolfschoten et al. in 2013 introduced the concept of Textbook Outcome (TO) where several perioperative parameters were combined into one composite matrix representing the ideal surgical care.[4,5] TO is a composite quality measure that incorporates multiple perioperative parameters to achieve the most desirable outcome. It provides holistic perspective and includes multiples facets involving patient care.[6] TO is achieved when a patient undergoes surgical resection without any adverse outcome, including postoperative complications, prolonged LOS, readmission or mortality. Thus, there has to be not even a single plausible deviation from the expected surgical process to achieve a TO. This encompasses a composite definition of quality care provided by a centre as well as a matrix to make comparison across hospitals.[4] TO has been developed and used as a quality indicator in various gastrointestinal surgeries, including bariatric, upper gastrointestinal, colorectal and pancreatic surgery.[7-9] Additionally, TO can be customised by incorporating procedure-specific parameters by experts, like postoperative pancreatic fistula rate, lymph node (LN) harvest, and standardised resection margin that are a part of TO assessment for patients undergoing surgery for pancreatic adenocarcinoma.

Liver surgery is a distinct super specialty of gastrointestinal surgery, where traditional postoperative outcome tools do not address hepatectomy-specific complications. Multifaceted care in liver surgery requires specific outcome parameters that can provide procedure-specific information to ensure quality assurance and patient safety.[10] In addition, individual outcome may reflect different aspects of quality. For example, post-hepatectomy liver failure (PHLF) may be influenced by availability of resources required to calculate the future liver remnant and hepatocyte function, mortality may relate to hospital volumes, LOS is influenced by discharge process and enhanced recovery after surgery protocols, and failure to rescue may be influenced by the quality and

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level of postoperative care. Oncological liver resections are unique, and the outcomes vary, depending on patient and tumour characteristics, location, extent of resection, and whether the underlying pathology is primary hepatobiliary malignancy or metastasis. For example, outcomes of liver resections performed for hepatocellular carcinoma (HCC) are influenced by underlying cirrhosis and future liver remnant, and cholestasis is a risk factor for mortality after liver resection for hilar cholangiocarcinoma.[10] Thus, the traditional CDC and CCI are not tailored to assess post-hepatectomy outcomes and quality parameters.[11]

The International study Group of Liver Surgery in 2011 proposed a classification for postoperative complications after hepatectomy. It included PHLF and haemorrhage, but there was a need for a unified system to enable standardisation and comparison of postoperative matrices globally.[12,13] After the initial concept of TO in surgical oncology, TO specific to liver surgery was defined by either a single expert or a small group of liver surgeons, but the first validated international definition came out through single-round survey from registered members of the International and European-African Hepato-Pancreato-Biliary Association.[14] The global expert consensus for TO in liver surgery was put together through modified Delphi method between July 2020 and October 2021, and is the accepted definition of TO for liver surgery worldwide (Table 1).

Merath et al. reported TO after liver surgery as no postoperative complications, no prolonged LOS, no 90-day readmission and no 90-day mortality for the first time in 2018. Of note, TO was achieved in 46.8% patients undergoing minor hepatectomy and 33.3% patients undergoing major hepatectomy, highlighting that only less than half of patients achieved optimal outcomes.[15] Subsequently, the same authors published the incidence of TO following liver resection for intrahepatic cholangiocarcinoma from a multi-institutional database from 15 major centres. TO was defined as R0 resection, no transfusions, no complications, no prolonged LOS, no 30-day readmission and no 30-day mortality, and TO was achieved only in 25.5% patients.[1] Another study examined TO for curative resection for HCCn 605 patients and observed TO in 62% patients, and, subsequently, patients who achieved TO had better 5-year overall survival of 69% compared to 56% among those who did not achieve TO.[16] In the context of oncological outcomes, these results validate the relevance of TO in achieving optimal outcomes.

After the initial published reports validating the relevance of TO to patient safety and quality, and better oncological outcomes, various authors from high-volume centres reported TO for liver resection. Tsilimigras et al. in 2020 assessed the TO in 1,829 patients undergoing liver resection for primary hepatic malignancies using a multi-institutional international database, and found that TO was achieved in 62% patients with significant association with decreased hazard of death. The study concluded that TO was associated with better long-term oncological outcomes. Of note was the fact that patients who achieved TO had significantly better 5-year overall survival (69.9%) than individuals who did not achieve TO (56.9%).[10] TO in laparoscopic and open surgery was assessed in a multicentre international dataset using propensity score matching, and 74.8% vs 61.9% TO was achieved in laparoscopic versus open resections, respectively. The findings also suggested that TO after liver surgery was an essential tool to assess patient-level care, and had utility in optimising patient outcomes.[14]

Further, hospital performance is one of the most important quality indicators for patients and other stakeholders.[17] Various ranking systems and designations are available to evaluate a hospital's performance. Teaching hospitals have demonstrated better surgical and oncological outcomes compared to non-teaching hospitals.[18,19] Mehta et al. reported the influence of hospital teaching status in achieving TO after hepato-pancreaticobiliary surgery for cancer, and concluded that the odds of achieving TO was greater in teaching hospitals compared to non-teaching hospitals driven by procedural volumes.[20]

Table-1: Textbook outcomes in liver surgery.

Definition of Textbook Outcome (TO) in Liver surgery.	
Intraoperative incidents	The absence of intraoperative incidents of grade 2 and 3 only
General postoperative complications	The absence of 90-day postoperative complications Clavien-Dindo III or higherThe absence of 90-day readmission due to surgery related complications Clavien-Dindo III or higher
Liver surgery related complications	The absence of postoperative bile leakage grades B and CThe absence of postoperative liver failure grades B and C
Mortality	The absence of in-hospital and 90-day mortality
Oncological resection margin	The absence of R1 and R2 resection margin for all margin indicators

Table-2: Published literature on outcomes of liver surgery in Pakistan.

Study	Institution	Number of cases	Component of TO	To rates
Begum et al,2017[25]	Aga Khan University, Hospital	75	Clavien-Dindo complications > III 22%Bile leak 5.3%90-day mortality 6.7%Positive margin 4%	60%
Nasir et al,2019 [26]	Pak Emirates Military Hospital	17	On-table mortality 3.7%Bile leak 3.7%	Not mentioned
Dar et al, 2019 [27]	Shifa International Hospital	24	Clavien-Dindo complications > III 50%Bile leak 4.1%PHLF 4.1%Positive margin 29.1	Not mentioned
Khan et al, 2022 [28]	Aga Khan University, Hospital	59	Bile leak 8%PHLF 5%90-day mortality 12%Positive margin 1.7%	63%
Kabir et al, 2023 [29]	Shaukat Khanum Memorial Cancer Centre	27	Bile leak 3.7%PHLF 3.7%90-day mortality 7.4%	81.5%

TO: Textbook outcomes, PHLF: Post-hepatectomy liver failure

Long-term cancer-related outcomes depend on multidisciplinary decision making and holistic care involving multiple specialties, and dedicated cancer centres have demonstrated superior outcomes than non-cancer centres. Mehta et al. investigated the outcomes for hepato-pancreaticobiliary surgeries and concluded that despite high comorbidities, the likelihood of achieving TO in dedicated cancer centres was higher than other centers.[21] Similarly, Endo et al. revealed that hospital volumes for minimally invasive hepatectomy were associated with more likelihood of achieving TO and improved long-term survival in patients with hepatic resection for HCC.[22]

In terms of health economic implications, any deviation from a normal postoperative course has significant financial implications, both for insured patients and those who pay out of their pocket. Data suggested that disproportionate amount of money was spent when TOs were not achieved after hepatopancreatic surgery. Data from US revealed that approximately $11,000 to $14,000 were paid less by an insurance company for patients who achieved TOs after minor and major liver resections compared to those who did not achieve the optimal outcomes.[21] Similarly, the company spent significantly less for patients who achieved TOs at teaching hospitals.[20] Improving TO not only significantly improves patients care, but also decreases the financial burden, ensuring cost-effective care.

In the context of Pakistan, HCC incidence is on rise, requiring curative treatment strategies to increase the survival of patients, which include transplant and resection.[23] Despite the compelling needs, evolution of liver surgery has been gradual, and only handful of centres were performing hepatic resections in Pakistan in late 2000. During the last decade, liver surgery has progressed rapidly, and dedicated hepatobiliary centres, both in private and public sectors, have been established in major cities of Pakistan. However, the outcome data is scare and there is a dire need to publish both surgical and oncological outcomes of hepatic resection. The current review was planned to evaluate the concept of TO in liver surgery, and discuss its application in Pakistan.

Materials and Methods

The review was conducted from November 15 to 20, 2024, and comprised literature search of peer-reviewed articles on PubMed, MEDLINE, Scopus and Google Scholar published between 2017 and 2024. The search was conducted with the help of key words and Boolean operators, including 'textbook outcomes', 'liver surgery AND patient safety' and 'liver surgery AND quality indicators'. Additional articles were identified from the studies in the references, and all studies were critically reviewed. Studies with only abstracts were excluded.

Results

A total of seventeen studies were identified, and five studies that met the criteria were reviewed in detail[25-29] The first report focusing on the surgical outcomes of hepatic resection was published by Begum et al. in 2017, and components of TO included were CDC grade, bile leak, PHLF, margin status, and 90-day mortality; with TO achieved in 60% patients.[24] Nasir et al. in 2019 published the outcomes of liver resection in 17 patients at a military hospital, and reported intraoperative adverse events, like on-table death of 1(5.9%) patient and bile leak in 1(5.9%). However, overall morbidity was not reported.[25] In the same year, Dar et al. published the outcomes of liver resection for hilar cholangiocarcinoma in 24 patients, and reported CDC >3 in 12(50%) patients, positive margin resection in 7(29%) patients and PHLF and bile leak in 1(4.1%).[26] Surgical and oncological outcomes of resection for HCC in 59 patients were published by Khan et al. in 2022, with TO in 37(63%).[27] The most recent report of 27 patients by Kabir et al. achieved TO in 22(81%) patients[28] Table-2.

Discussion

There is paucity of literature reporting outcomes of liver surgery despite increasing number of HPB centres. Even in the reports published, all components of TO are not included to evaluate composite outcomes and measure surgical quality. TO reporting is imperative in our part of the world as majority of patients pay out of their pockets, and TO can help them track the quality of hospital at the macro level to decide best possible care at low cost. In addition, TO provides standardised measure of ideal surgical outcomes for benchmarking and quality improvement. Publishing TO can foster a culture of accountability and encourage the centres to critically evaluate and improve their own practices. Similarly, transparency builds trust among patients and stakeholders, including the government, to allocate funds for these centres to further improve infrastructure to provide state-of-the-art care for patients undergoing liver resection. Additionally, positive outcomes can also attract international collaborators for research and healthcare development.

Conclusion

In countries like Pakistan that have resource constraints, varied health literacy and lower access to healthcare facilities, TO provides a critical tool for informed decision-making. Incorporation of information about outcome metrics can empower patients to make informed decisions that align with their personal choices and available resources. Furthermore, it helps establish benchmarks, promote transparency and foster international collaboration, ultimately contributing to better patient outcomes.

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