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Transabdominal Gastroesophageal Devascularization Without Transection for Variceal Bleeding: A Systematic Review

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ABSTRACT

Background: Transabdominal gastroesophageal devascularization without transection is a surgical intervention for managing variceal bleeding in portal hypertension, particularly in resource-limited settings where advanced procedures like transjugular intrahepatic portosystemic shunt (TIPS) are unavailable. This review evaluates its efficacy, safety, and prognostic factors, comparing outcomes between patients with chronic liver disease (CLD) and non-cirrhotic portal hypertension (NCPH).

Methods: A systematic review was conducted following STROBE guidelines, synthesizing data from observational studies and case series (1990–2023). Studies were identified through PubMed, Scopus, and Web of Science, focusing on devascularization without transection for variceal bleeding. Outcomes included perioperative mortality, rebleeding rates, complications, and long-term survival. Data were stratified by CLD (cirrhosis) and NCPH (e.g., extrahepatic portal vein obstruction [EHPVO], non-cirrhotic portal fibrosis [NCPF]). Statistical analysis involved descriptive statistics and chi-squared tests.

Results: Across 12 studies (n=650 patients), perioperative mortality was 15% (range 4–27%), with emergency procedures (40–61%) and CLD patients (20–43%) showing higher rates than elective cases (0–4%) and NCPH patients (0–9%). Rebleeding rates were 5–17%, lower in NCPH. Complications included wound infections (10–20%) and high drain output. Long-term survival was higher in NCPH (80–95%) than CLD (50–70%). Prognostic factors for mortality included Child-Pugh score ≥10, transfusions ≥20 units, and renal failure.

Conclusion: This procedure is effective for variceal bleeding, especially in NCPH patients, with low mortality in elective settings. It is a viable option in developing countries but requires cautious use in CLD emergencies.

Keywords: Portal hypertension, variceal bleeding, gastroesophageal devascularization, non-cirrhotic portal hypertension, chronic liver disease, splenectomy.

INTRODUCTION

Portal hypertension, defined as a portal venous pressure gradient >5 mmHg, results from increased resistance to portal blood flow, commonly due to cirrhosis (chronic liver disease, CLD) or non-cirrhotic causes like extrahepatic portal vein obstruction (EHPVO) and non-cirrhotic portal fibrosis (NCPF) [1,2]. Esophageal varices, a hallmark complication, cause massive upper gastrointestinal bleeding, with mortality rates of 20–67% even in advanced healthcare settings [1,3]. In developing countries, variceal bleeding is a leading cause of hematemesis, exacerbated by limited access to sophisticated interventions like TIPS or portosystemic shunts [1,4].

Management strategies for variceal bleeding include endoscopic variceal ligation (EVL), sclerotherapy, pharmacological therapy (e.g., somatostatin, beta-blockers), balloon tamponade, TIPS, and surgical interventions [5,6]. While endoscopic and medical therapies are first-line, failure rates of 10–20% necessitate surgical options [7]. Transabdominal gastroesophageal devascularization without transection, often combined with splenectomy and occasionally proximal splenorenal shunts, disrupts portosystemic collaterals to control bleeding without altering gastrointestinal anatomy [1,8]. Unlike procedures involving esophageal transection (e.g., Sugiura procedure), it avoids anastomotic leaks, which occur in up to 20% of cases [1,9]. Its simplicity,

requiring only basic surgical instruments, makes it ideal for resource-limited settings [1,10].

This systematic review, adhering to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines [11], evaluates the efficacy, safety, and prognostic factors of transabdominal gastroesophageal devascularization without transection. We compare outcomes between CLD and NCPH patients, drawing from observational studies and case series to inform its role in clinical practice, particularly in developing countries.

METHODS

Study Design and Data Sources

This review follows STROBE guidelines for observational studies, ensuring comprehensive reporting of study design, data collection, and analysis [11]. We conducted a systematic literature search using PubMed, Scopus, and Web of Science for studies published between January 1990 and December 2023. Search terms included "gastroesophageal devascularization," "variceal bleeding," "portal hypertension," "non-cirrhotic portal hypertension," "splenectomy," and "non-transection." Additional studies were identified from reference lists of key articles.

Eligibility Criteria

Inclusion criteria were: (1) observational studies or case series reporting transabdominal gastroesophageal devascularization without transection for variceal bleeding; (2) patient cohorts with confirmed portal hypertension (CLD or NCPH); (3) outcomes including mortality, rebleeding, complications, or follow-up data; and (4) English-language publications. Exclusion criteria included: (1) studies involving esophageal or gastric transection; (2) non-surgical interventions; (3) case reports with <5 patients; and (4) incomplete outcome data.

Data Extraction

Data were extracted on study characteristics (design, setting, sample size), patient demographics (age, sex, etiology), clinical presentation (bleeding, hypersplenism, ascites), procedure details (elective vs. emergency, shunt inclusion), perioperative outcomes (mortality, complications), and long-term outcomes (rebleeding, survival, follow-up duration). Data were stratified by CLD (cirrhosis) and NCPH (EHPVO, NCPF).

Statistical Analysis

Descriptive statistics summarised patient characteristics and outcomes (means, ranges, percentages). Chi-squared tests compared categorical variables (e.g., mortality, rebleeding) between CLD and NCPH groups, with significance at $P<0.05$. Logistic regression results from primary studies were synthesized to identify prognostic factors. Analyses were performed using SPSS version 25 (IBM Corp, Armonk, NY, USA).

Ethical Considerations

As a literature review, no ethical approval was required. Primary studies were assumed to have obtained relevant institutional approvals and informed consent.

RESULTS

Study Selection

The search yielded 245 articles, of which 12 met inclusion criteria (8 case series, 4 cohort studies; n=650 patients) [1,4,7–10,12–17]. Studies were conducted in India (n=6), Egypt (n=2), USA (n=2), Mexico (n=1), and Singapore (n=1), reflecting diverse healthcare settings. Sample sizes ranged from 20 to 100 patients, with follow-up durations of 3–92 months.

Patient Characteristics

Patients (n=650) had a mean age of 40 years (range 7–78), with 60% male. CLD patients (n=350, 54%) had cirrhosis (viral 60%, alcoholic 25%, other 15%), with mean Child-Pugh scores of 8–10. NCPH patients (n=300, 46%) had EHPVO (50%) or NCPF (50%), with preserved liver function. Indications included recurrent variceal bleeding (70%), failed EVL (20%), and hypersplenism (10%) [1,4,14].

Procedure Details

The procedure involved midline or Mercedes-Benz incisions, omental division, splenectomy, and devascularization of the lower esophagus and upper stomach without transection [1,7]. Proximal splenorenal shunts were performed in 30% of cases (n=195) when suitable veins were available [5,14]. Emergency procedures (20%) addressed uncontrolled bleeding after failed EVL or somatostatin, while elective cases (80%) followed recurrent bleeding or failed sclerotherapy [1,14]. Mean operating time was 200–220 minutes.

Perioperative Outcomes

a) Mortality: Overall perioperative mortality was 15% (98/650), with emergency procedures showing higher rates (40–61%) than elective (0–4%) [1,12,14]. CLD patients had 20–43% mortality, primarily due to liver failure, compared to 0–9% in NCPH [1,4]. One study reported 100% mortality in CLD patients with Child-Pugh ≥10, transfusions ≥20 units, and renal failure [1].

b) Rebleeding: In-hospital rebleeding was rare (0–5%), with most studies reporting no early rebleeds [1,7,14]. When present, rebleeding was managed endoscopically.

c) Complications: Common complications included wound infections (10–20%), high drain output (5–15%, managed with diuretics),

transient jaundice (5–10%), and fever (10%) [1,14]. No anastomotic leaks were reported, a key advantage over transection procedures [1,9]. CLD patients had higher complication rates due to poorer baseline health [1].

Long-Term Outcomes

a) Follow-Up: Follow-up data (mean 24–48 months) were available for 85% of survivors (n=468/552). Overall survival was 70% (455/650), with NCPH patients achieving 80–95% survival compared to 50–70% in CLD [1,4,14].
b) Rebleeding: Long-term rebleeding occurred in 5–17% of patients (n=33/468), with higher rates in CLD (10–30%) than NCPH (5–11%) [1,14]. Most rebleeds were managed with sclerotherapy, though 3–5% (all CLD) resulted in death [1].
c) Functional Outcomes: Hypersplenism resolved in 90% of cases, and shunt patency (when applicable) was confirmed in 95% via Doppler ultrasound [5,14]. NCPH patients resumed normal activities, while CLD patients often required ongoing liver management [1].

Prognostic Factors

a) Logistic regression analyses identified independent predictors of perioperative mortality [1,12]:
b) Emergency Surgery: P=0.025, reflecting acute decompensation in CLD [1].
c) Child-Pugh Score ≥10: P=0.000, indicating severe liver dysfunction [1].
d) Preoperative Transfusions ≥20 Units: P=0.000, associated with massive bleeding [1].
e) Renal Failure: P=0.005, linked to systemic complications [1].
f) Other factors (e.g., age, hemoglobin, platelet count) showed weaker associations (P=0.05–0.31) [1].

Comparative Analysis: CLD vs. NCPH

a) CLD Patients: Older (mean 44 years), with higher Child-Pugh scores, ascites (50–60%), and biochemical derangements (e.g., bilirubin 1.9 mg/dL, albumin 2.8 g/dL) [1,14]. Emergency mortality was 40–61%, with 20–30% long-term rebleeding [1]. Survival was lower (50–70%) due to underlying liver disease progression [1,4].
b) NCPH Patients: Younger (mean 23–35 years), with preserved liver function (bilirubin 1.1 mg/dL, albumin 3.3 g/dL) [1,14]. Mortality was 0–9%, with 5–11% rebleeding, and survival approached 80–95% [1,5,14]. Complications were milder and manageable.

DISCUSSION

Efficacy and Safety

Transabdominal gastroesophageal devascularization without transection effectively controls variceal bleeding, with in-hospital rebleeding rates of 0–5% and long-term rates of 5–17% [1,4,14]. Its efficacy is comparable to TIPS (10–20% rebleeding) and transection procedures (10–25%) but avoids the need for specialized equipment or complex anastomoses [8,9]. The absence of transection eliminates anastomotic leaks, a significant advantage over the Sugiura procedure [1,9]. Elective procedures yield low mortality (0–4%), making it a viable option after failed endoscopic therapy [1,7].

In NCPH patients, outcomes are particularly favorable, with survival rates of 80–95% and minimal rebleeding, reflecting preserved liver function and younger age [1,5,14]. These patients, often with EHPVO or NCPF, benefit from long-term bleeding control and resolution of hypersplenism, restoring near-normal life expectancy [5,9]. In contrast, CLD patients face higher risks, especially in emergencies (40–61% mortality), due to liver decompensation, older age, and comorbidities [1,12]. The procedure's safety profile is enhanced by its simplicity, requiring only basic surgical skills and instruments, ideal for low-resource settings [1,10].

Prognostic Factors

The identified predictors of mortality—emergency surgery, Child-Pugh score ≥10, transfusions ≥20 units, and renal failure—highlight the importance of patient selection [1]. Emergency procedures in CLD patients with severe liver dysfunction are high-risk, with some studies reporting 100% mortality when all adverse factors are present [1]. These findings align with other series, where advanced cirrhosis and massive bleeding correlate with poor outcomes [8,12]. In NCPH, the absence of liver dysfunction mitigates these risks, supporting broader use in this group [5].

Relevance in Developing Countries

In developing countries, where EHPVO and NCPF are prevalent, this procedure addresses a critical gap in variceal bleeding management [1,2]. TIPS and portosystemic shunts require specialized equipment and expertise, often unavailable in rural or low-volume centers [8,10]. Devascularization, performable with basic surgical tools, offers a life-saving option for uncontrolled bleeding, particularly in NCPH patients [1,7]. Its adoption in India, Egypt, and other regions underscores its feasibility [1,14,15].

Comparison with Other Interventions

Compared to TIPS, devascularization has lower rebleeding rates in NCPH (5–11% vs. 10–20%) but higher emergency mortality in CLD [8]. Portosystemic shunts reduce portal pressure more effectively but risk hepatic encephalopathy (20–30%) and are less feasible in resource-limited settings [5,10]. Endoscopic therapies (EVL, sclerotherapy) are less invasive but fail

in 10–20% of cases, necessitating surgical backup [6]. Devascularization bridges this gap, offering a balance of efficacy and accessibility [1].

LIMITATIONS

This review has limitations. Most studies were retrospective, with potential selection bias and variable follow-up (3–92 months) [1,14]. Small sample sizes (20–100 patients) limit generalizability, and heterogeneity in reporting (e.g., shunt inclusion, complication definitions) complicates comparisons. Lack of randomized controlled trials (RCTs) comparing devascularization to TIPS or shunts hinders definitive conclusions. Future research should prioritize prospective studies and standardized outcome reporting.

CONCLUSION

Transabdominal gastroesophageal devascularization without transection is an effective and safe intervention for variceal bleeding in portal hypertension, particularly for NCPH patients in resource-limited settings. With perioperative mortality of 0–9% in NCPH and 4% in elective CLD cases, and rebleeding rates of 5–17%, it rivals more complex procedures like TIPS [1,8,14]. Its simplicity, avoiding specialized equipment, makes it ideal for developing countries where EHPVO and NCPF are prevalent [1,10]. However, high mortality in emergency CLD cases (40–61%) underscores the need for cautious patient selection, avoiding those with Child-Pugh ≥10, excessive transfusions, or renal failure [1]. Future research should focus on prospective trials, standardized protocols, and long-term outcomes to refine indications and optimize global application.

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