THE ‘BLOWN’ DUODENAL STUMP

IS IT A SURGICAL ANACHRONISM?

B SINGH

KING EDWARD VIII HOSPITAL

PRETORIA CONTROVERSIES MEETING

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THE ‘BLOWN’ DUODENAL STUMP

PubMed search: “blown, burst, leaking duodenal stump”, “difficult duodenum”
US National Library of Medicine National Institute of Health

THE ‘BLOWN’ DUODENAL STUMP

WHY A SURGICAL ANACHRONISM?

The problem of safe closure of the duodenal stump has been foremost in the minds of surgeons since the introduction of Billroth II gastrectomy.

Billroth I 1881

Billroth II 1885

Billroth II modifications

Kronlein 1887
Von Eisenberg 1889
Braun 1892
Roux 1893
Reichel 1908
Polya 1911
Finsterer
Hofmeister 1914
Balfour
Moynihan 1923

“If it ain’t broke, don’t fix it” - Thomas Bertram Lance - Nation’s Business May 1977
WHY A SURGICAL ANACHRONISM?

- Recognition that exclusively associated with Billroth II reconstructions prompted preference for Billroth I

- Decline in gastrectomy rates for management of peptic ulcer disease

  “restoration of gastrointestinal continuity by gastroduodenostomy eliminates the problems of the technically difficult duodenum”

THE ‘BLOWN’ DUODENAL STUMP

IS IT A SURGICAL ANACHRONISM?

“that within the past decade, articles about duodenal blowout have virtually disappeared from the literature”

- Incidence ranges between 3-5%
- Mortality as high as 50% ([Larson *et al* 1951]) → 12% ([Burch *et al* 1991])

“Although the present day surgeon will operate much less for peptic ulcer disease as compared to his predecessors, much can be learnt from their experiences”

“.......... the historical sense is not simply an awareness of incidents as having happened in the past, but an awareness of the continued presence of that past in the present”
T S Eliot - “Tradition and the Individual Talent”
THE ‘BLOWN’ DUODENAL STUMP

IS IT A SURGICAL ANACHRONISM?

- Incidence ranges between 3-5%
- Mortality as high as 50% (Larson BB et al, 1951) → 12% (Burch JM et al 1991)

BLOWN DUODENAL STUMP
1983

- Intra-abdominal sepsis
- Enterocutaneous fistula
- Renal failure
- TPN over 6 months

Courtesy Prof AA Haffejee
THE ‘BLOWN” DUODENAL STUMP

PATHOGENESIS

- excessive dissection of duodenal stump *
- Inadequate duodenal stump closure
- ischemia and necrosis (over zealous suturing)
- increased pressure or tension on duodenal stump caused by acute afferent loop obstruction *
- inappropriate usage of cautery
- malnutrition, hypo-proteinemia
- coexistent disease - diabetes, pneumonia, or asthma
- local pancreatitis
THE ‘BLOWN’ DUODENAL STUMP

PATHOGENESIS: ANATOMICAL FACTORS

- Poor blood supply - excessive dissection of duodenal stump

> "Surgeons should not skeletonize more than 2 cm of the first part of the duodenum. If more than 2 cm of skeletonization is done, a duodenostomy using a Foley catheter may be necessary to avoid blow-up of the stump secondary to poor blood supply". *

- Absence of serosa posterior and peritoneum along mid-descending duodenum
- Reduction of circular muscles – “thin-walled” duodenum

THE ‘BLOWN’ DUODENAL STUMP

PATHOGENESIS

- excessive dissection of duodenal stump
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THE ‘BLOWN” DUODENAL STUMP

ACUTE AFFERENT LOOP OBSTRUCTION
PATHOGENESIS

- excessive dissection of duodenal stump
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THE ‘BLOWN’ DUODENAL STUMP

THE “DIFFICULT’ DUODENUM: PREVENTIVE OPTIONS

IF YOU FAIL TO PLAN, YOU PLAN TO FAIL!

❖ Billroth I avoids the issues of duodenal stump
❖ If Billroth I not possible:
   1. Nissen–Bsteh procedure
   2. Bancroft procedure
   3. Tube duodenostomy (end or side)
   4. Duodenojejunostomy
   5. Purse-string closure

Recognition reflects surgical insight
Choice of intervention reflects institutional bias
GASTRODUODENOSTOMY WITH “DIFFICULT DUODENUM”

restoration of gastrointestinal continuity by gastroduodenostomy eliminates the problems of the technically difficult stump


- division of gastrohepatic & gastrocolic omentum
- mobilisation of splenic flexure
- formation of “neo lesser curvature”

Schein M, Gecelter GR. Gastroduodenostomy for the “difficult duodenum”

S Afr J Surg 1009; 28:16-7
THE “DIFFICULT’ DUODENUM: PREVENTIVE OPTIONS

Nissen–Bsteh procedure

Bancroft procedure
THE "DIFFICULT' DUODENUM: PREVENTIVE OPTIONS

DUODENOSTOMY

END-DUODENOSTOMY       SIDE-DUODENOSTOMY
THE “DIFFICULT’ DUODENUM: PREVENTIVE OPTIONS

- Gastrectomy extended to D1
- Duodenal stump remains at the same level of the pancreatic capsule

Reconstruction with Roux-en-Y end-to-end duodenojejunal anastomosis

DUODENOJEJUNOSTOMY (DJ) vs "CLASSICAL" STUMP CLOSURE (CC) [NISSEN-BSTEH] FOR MANAGEMENT OF THE “DIFFICULT” DUODENUM

- significantly reduced the mortality rate (4.8% vs 16.1%, $P < 0.04$)
- morbidity similar
- duodenal leakage rate between DJ and CC of borderline significance
- temporary biliary diversion substantially improved perioperative outcome

Vashist YK et al.
Management of the difficult duodenal stump in penetrating duodenal ulcer disease: a comparative analysis of duodenojejunostomy with "classical" stump closure (Nissen-Bsteh)

Langenbecks Arch Surg 2012;397(8):1243-9
Duodenal stump closure conventionally, with tube duodenostomy or either by the Nissen or Bancroft closure evaluated in 200 patients

Burch et al, 1991 (Level of Evidence 2)

- Conventional closures performed in 160 patients (80%)
- Nissen's closure in 25 (13%)
- Bancroft's closure in 6 (3%)
- Tube duodenostomy in 9 (5%)

Leak rate
  - 2.5% in the conventional closure group
  - 33% in the tube duodenostomy group
  - 0% in both the Nissen or Bancroft closure groups

The Nissen or Bancroft closures were concluded to be the methods of closure for a difficult duodenum

Burch JM, Cox CL, Feliciano DV, Richardson RJ, Martin RR
Retrospective study - 2034 cases of total or subtotal gastrectomy for cancer (1995 to 2009)

- Purse-string suture vs linear cutting stapler and full-thickness closure with seromuscular layer suture

- Duodenal stump leakage (total 11/2034)
  - Purse-string suture (465) - no leakage
  - Linear cutting stapler and seromuscular layer suture (6/835)
  - Full-thickness and seromuscular layer suture (5/734)

- No peri-operative mortality in any group
- No significant difference among the groups for intra-abdominal hemorrhage, anastomotic leakage, abdominal infection and wound infection
THE “NORMAL’ DUODENUM: PREVENTIVE OPTIONS

APPLICATION OF PURSE –STRING SUTURE

No leaks in 465 cases of using purse-string suture
shorter operative time and lower cost

PRESENTATION & DIAGNOSIS

- Rare before the 4\textsuperscript{th} or 5\textsuperscript{th} post-operative
- Severe upper abdominal pain
- Localised peritonitis
- Fever, tachycardia +/- hypotension
- Jaundice (within 48 hours) - absorption of bile from the peritoneal cavity
- Bile-stained fluid on abdominal drainage
- High index of suspicion
THE ‘BLOWN’ DUODENAL STUMP

DIAGNOSIS & MANAGEMENT

- Haemodynamic stabilisation
- CT scan - fluid collection in the hepato-renal fossa
  - extravasation of oral contrast

- Conservative
  - percutaneous drainage + afferent loop decompression
    (endoscopic/fluoroscopic guided nasojejunal intubation
  - nasojejunal tube in efferent loop for enteral feeding

- Surgical
  - thorough peritoneal lavage
  - wide and adequate drainage of Morrison’s pouch
  - duodenostomy (end-, side)
‘BLOWN’ DUODENAL STUMP: MANAGEMENT ALGORITHM

DIFFICULT DUODENAL CHALLENGES

DIFFICULT DUODENAL INTRAOPERATIVELY

SURGICAL OPTIONS
- NISSEN’S
- BANCROFT
- DUODENOSTOMY
- DUODENOJEJUNOSTOMY

POST-OP LEAK SUSPECTED

STABILIZE CT SCAN

- PERCUTANEOUS DRAINAGE
- AFFERENT LOOP DECOMPRESSION
- NASO-JEJUNAL TUBE EFFERENT LOOP FOR FEEDING

EXPLORE & DECOMPRESS

FAILS
THE ‘BLOWN’ DUODENAL STUMP

- relegated challenge in current practice
  ........ *but can be devastating!*
- early recourse to preventive strategies
- surgical nous, insight, experience

Praemonitus praemunitus

“To Be Forewarned Is To Be Forearmed”