THE ‘BLOWN” DUODENAL STUMP

IS IT A SURGICAL ANACHRONISM?

B SINGH

KING EDWARD VIII HOSPITAL

PRETORIA CONTROVERSIES MEETING

4th October 2013

THE 'BLOWN" DUODENAL STUMP

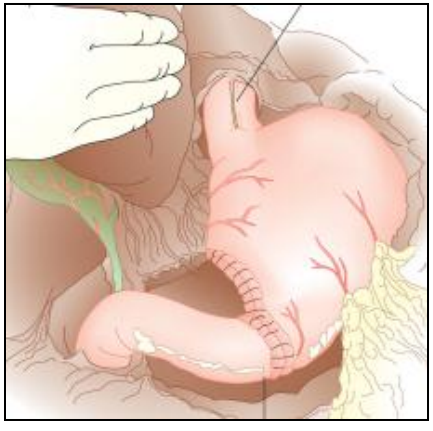
PubMed search: "blown, burst, leaking duodenal stump", "difficult duodenum"
US National Library of Medicine National Institute of Health

- The blown duodenal stump: an avoidable complication. Woodward ER, Arch Surg 1980 Jun;115(6):693
- Partial resection of the antrum, gastroduodenostomy, and selective proximal vagotomy--surgical procedure in the therapy of peptic ulcer *Zöckler CE, Akdemir B, Dethlefsen H, Meyer I, Strosche H. Leber Magen Darm. 1974 Jul; 4(4):167-74.*
- Selection of operation for duodenal ulcer based on acid secretory studies--a reappraisal. *Robbs JV, Bank S, Marks IN, Louw JH. Br J Surg. 1973 Aug; 60(8):601-5.*
- The radiological diagnosis of ulcer recurrence following drainage operations *Sapounov S, Krause D. Rofo. 1975 Jun; 122(6):547-50.*
- Technical variants of performing the proximal gastric vagotomy (review of the literature). *Gorbunov VN, Naumov BA. Khirurgiia (Mosk). 1989 Aug; (8):143-8.*
- *Review The Sun Yat-sen Lecture. The surgical treatment of duodenal ulcer: past, present and future.* J Gastroenterol Hepatol. 1994
- Percutaneous management of postoperative duodenal stump leakage with Foley catheter. Oh JS, Lee HG, Chun HJ, Choi BG, Lee SH, Hahn ST, Ohm JY. Cardiovasc Intervent Radiol. 2013 Mar 13.

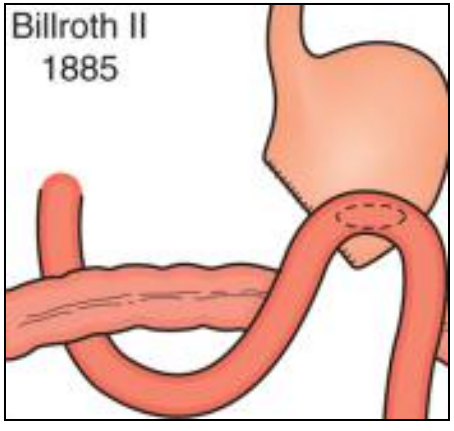
THE ‘BLOWN” DUODENAL STUMP

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

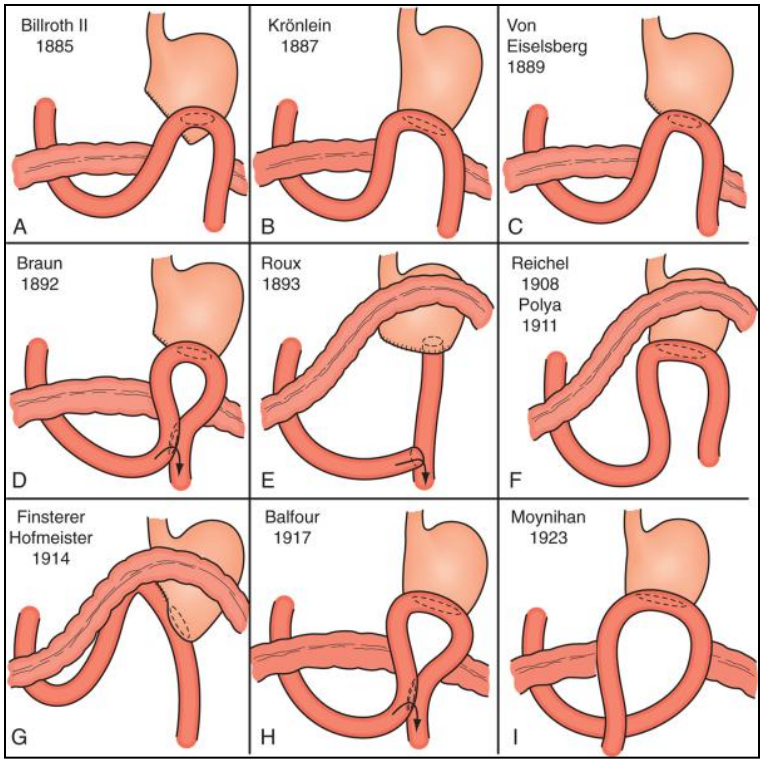
Kronlein	1887
Von Eisenberg	1889
Braun	1892
Roux	1893
Reichel	1908
Polya	1911
Finsterer	
Hofmeister	1914
Balfour	
Moynihan	1923

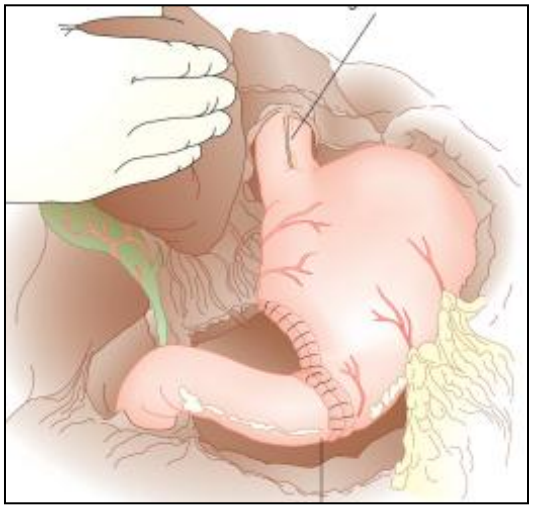
Billroth II modifications

“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"

Fuertst EJ. Am J Surg 1968;115:287-290

THE 'BLOWN" DUODENAL STUMP

IS IT A SURGICAL ANACHRONISM?

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

Griffen WO. Whither goe'st the duodenal stump blowout? Arch Surg. ***1973****;107:11*

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

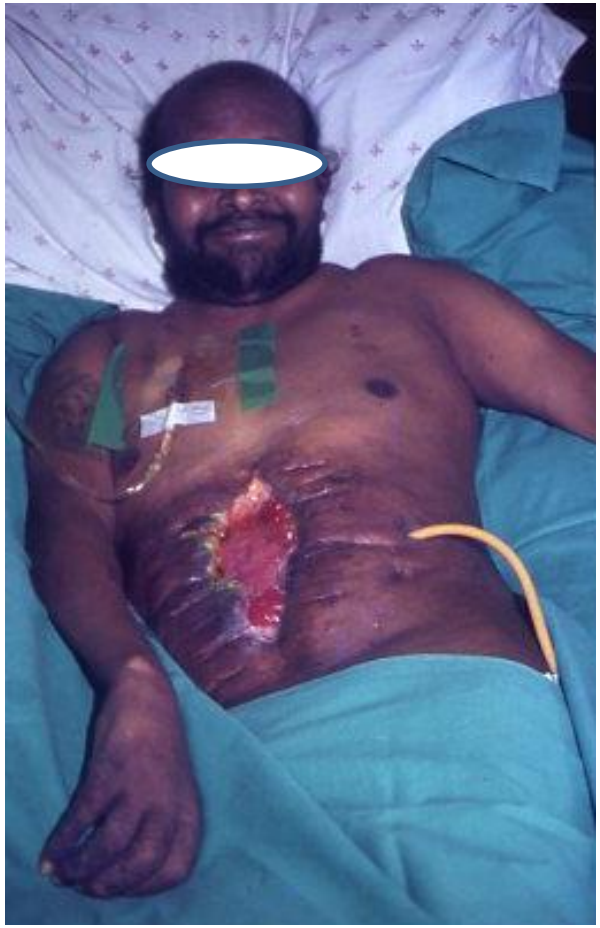
"Although the present day surgeon will operate much less for peptic ulcer disease as compared to his predecessors, much can be learnt from their experiences"

" …….. 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?



BLOWN DUODENAL STUMP
1983

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

Courtesy Prof AA Haffejee

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

THE ‘BLOWN” DUODENAL STUMP

PATHOGENESIS

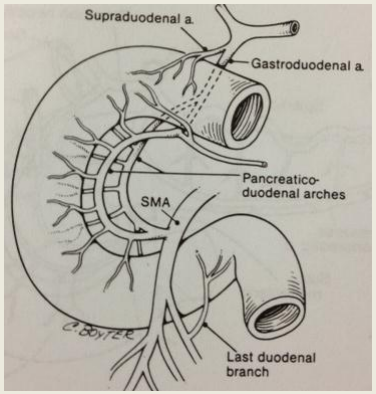
- **excessive dissection of duodenal stump ***
- Inadequate duodenal stump closure
- ischemia and necrosis (over zealous suturing)
- increased pressure or tension on duodenal stump caused by acute afferent loop obstruction *
- inappropriate usage of cautery
- malnutrition, hypo-proteinemia
- coexistent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

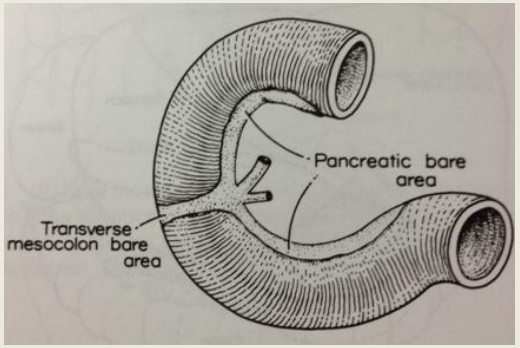
THE ‘BLOWN” DUODENAL STUMP

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

***** Androulakis J, Colborn GL, Skandalakis JE, Skandalakis LJ, Skandalakis PN. Embryologic and anatomic basis of duodenal surgery. Surg Clin North Am 2000; 80:171-99

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** *
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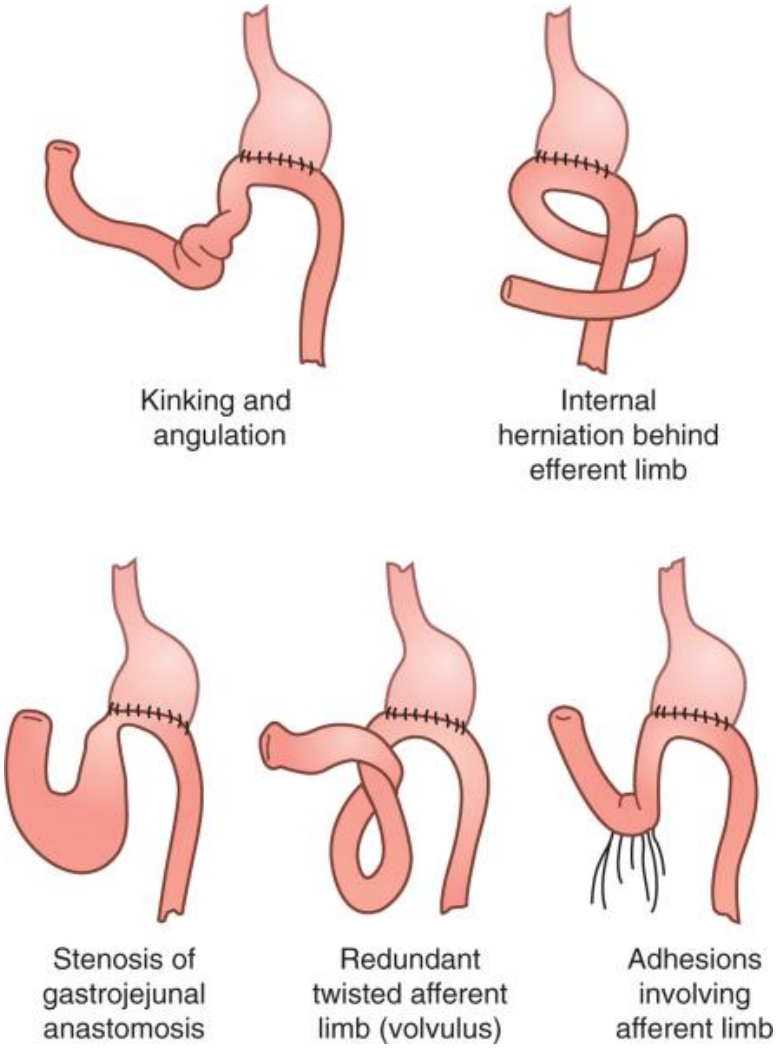
THE ‘BLOWN” DUODENAL STUMP



ACUTE AFFERENT LOOP OBSTRUCTION

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

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

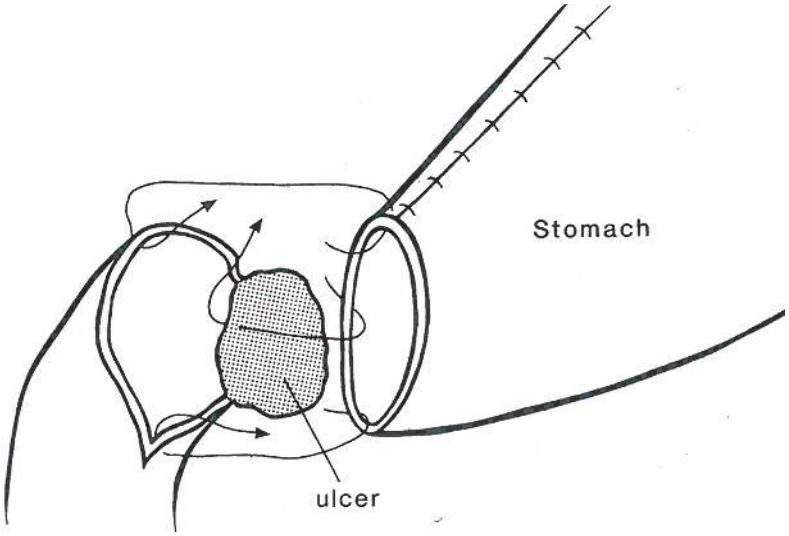
Recognition reflects surgical insight
Choice of intervention reflects institutional bias

GASTRODUODENOSTOMY WITH “DIFFICULT DUODENUM’

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

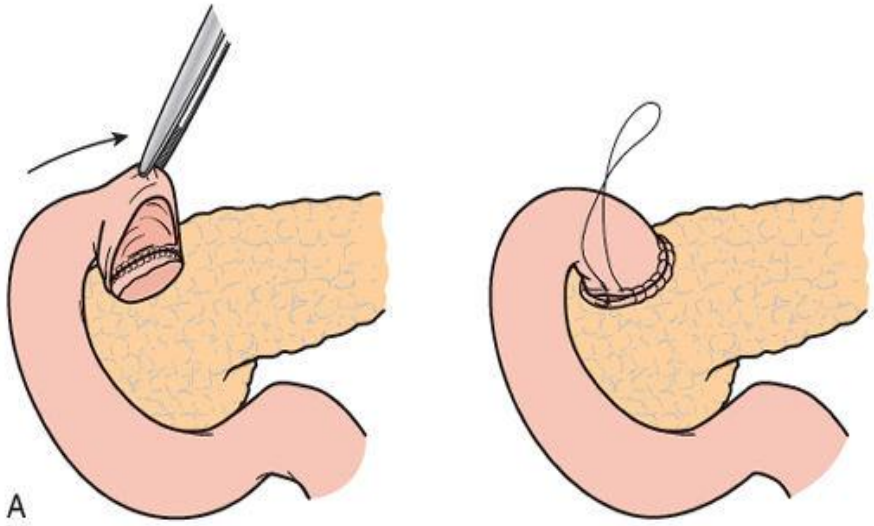
Fuerst EJ. An answer to the difficult duodenal stump. Am J Surg. 1968:115: 287 - 90

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

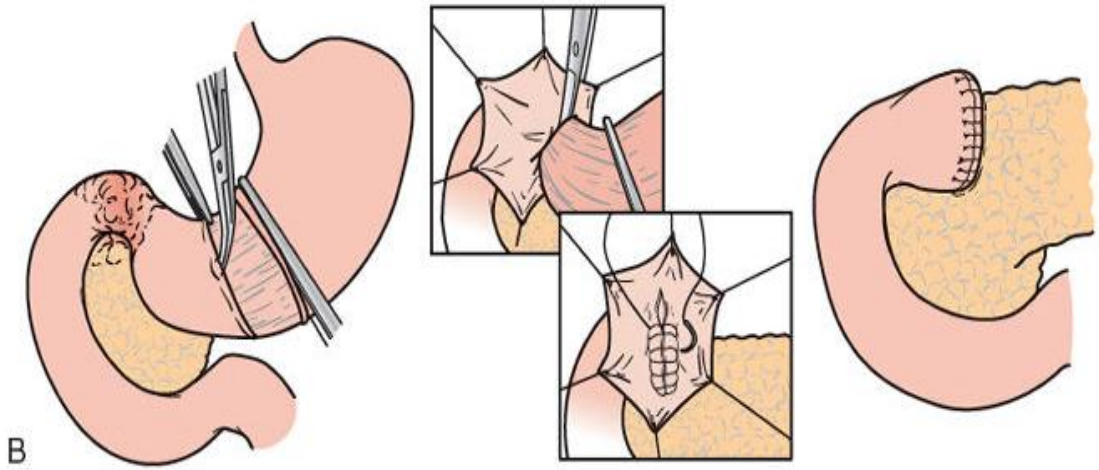


Schein M, Gecelter GR. Gastroduodenostomy for the “difficult duodenum”
S Afr J Surg 1009; 28:16-7

THE “DIFFICULT’ DUODENUM: PREVENTIVE OPTIONS



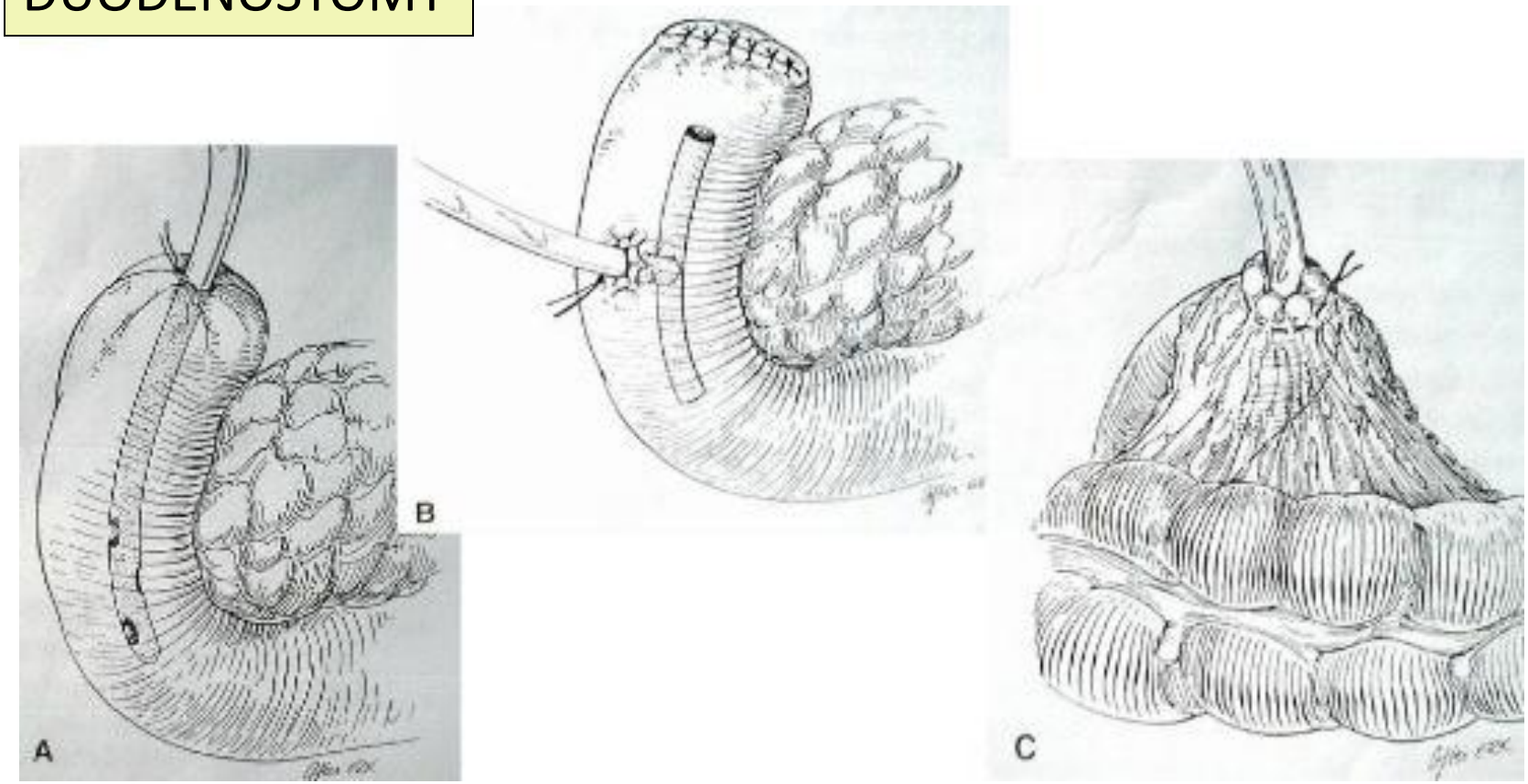
Nissen–Bsteh procedure



Bancroft procedure

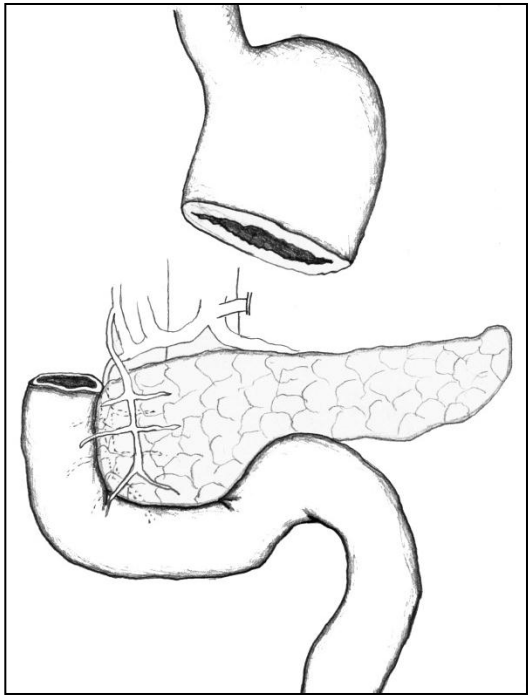
THE "DIFFICULT' DUODENUM: PREVENTIVE OPTIONS

DUODENOSTOMY

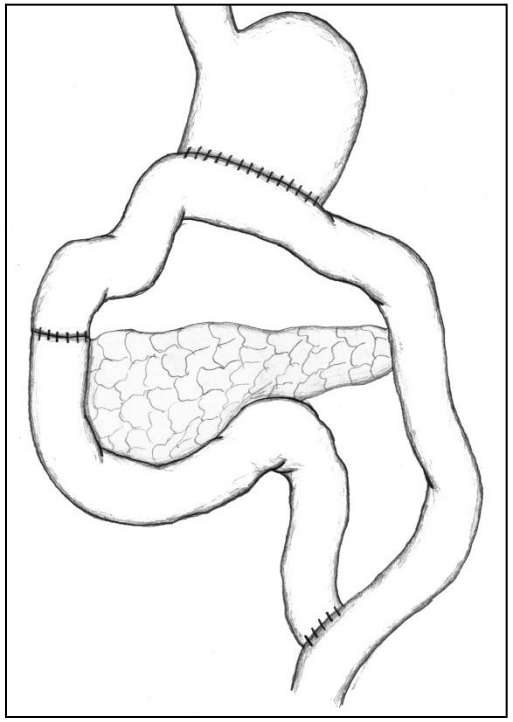


END-DUODENOSTOMY SIDE-DUODENOSTOMY

THE “DIFFICULT’ DUODENUM: PREVENTIVE OPTIONS



DUODENOJEJUNOSTOMY

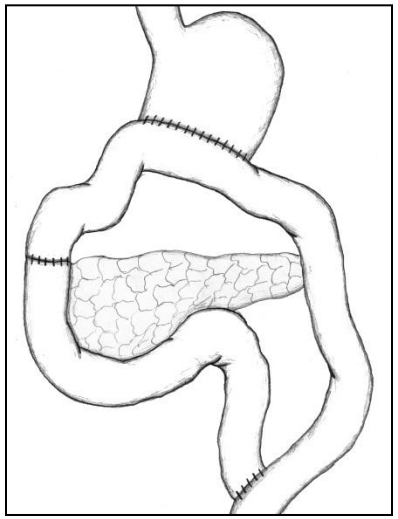


- Gastrectomy extended to D1
- Duodenal stump remains at the same level of the pancreatic capsule

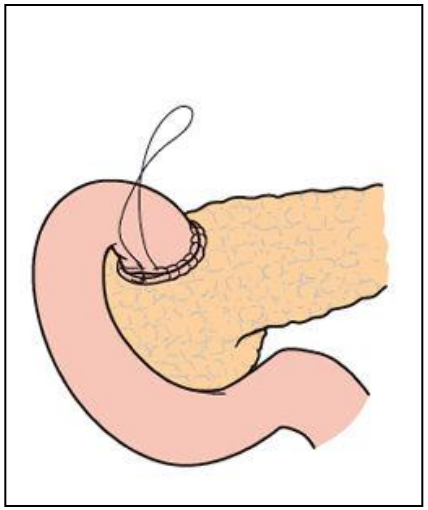
Reconstruction with Roux-en-Y end-to-end duodenojejunal anastomosis

Manenti A, Pavesi E. The "Ultra Low" Duodenal Stump and its Difficult Management: An Old Technique Revisited. Webmed Central SURGICAL TECHNIQUE 2011;2(6):WMC001998

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



vs



DUODENOJEJUNOSTOMY

- 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

THE "DIFFICULT' DUODENUM: PREVENTIVE OPTIONS

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
Management of the difficult duodenal stump. Am J Surg 1991 Dec;162(6):522-6

THE "NORMAL' DUODENUM: PREVENTIVE OPTIONS

APPLICATION OF PURSE –STRING SUTURE

Shao QS, Wang YX et al.
Application of purse-string suture for management of duodenal stump in radical gastrectomy
Chin Med J 2011; 124:1018-21

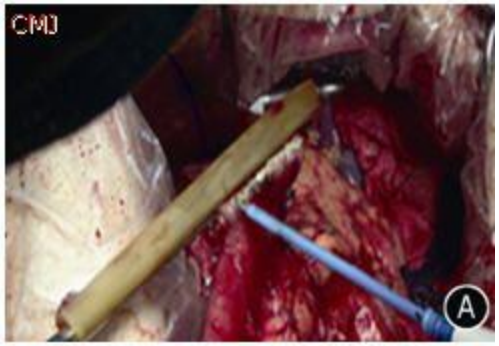
Retrospective study - **2034** cases of total or subtotal gastrectomy for cancer
(1995 to 2009)

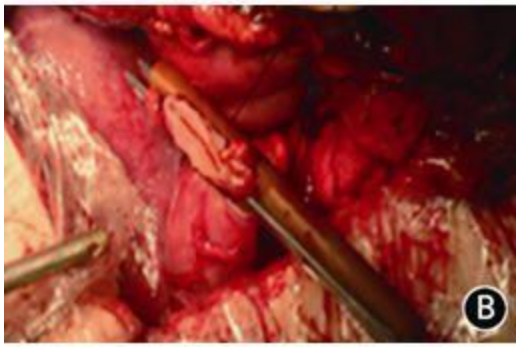
- Purse-string suture *vs* linear cutting stapler and full-thickness closure with seromuscular layer suture

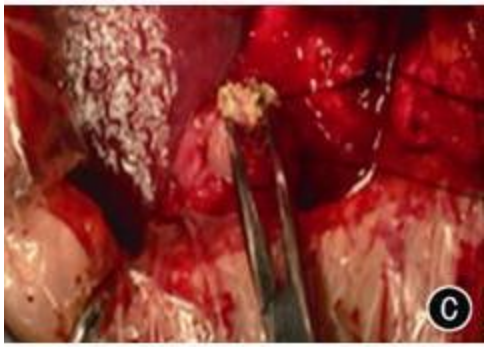
- **Duodenal stump leakage (total 11/2034)**
  - **Purse-string suture (465) - no leakage**
  - **Linear cutting stapler and seromuscular layer suture** (6/**835)**
  - **Full-thickness and seromuscular layer suture (5/734)**
- No peri-operative mortality in any group
- No significant difference among the groups for intra-abdominal hemorrhage, anastomotic leakage, abdominal infection and wound infection

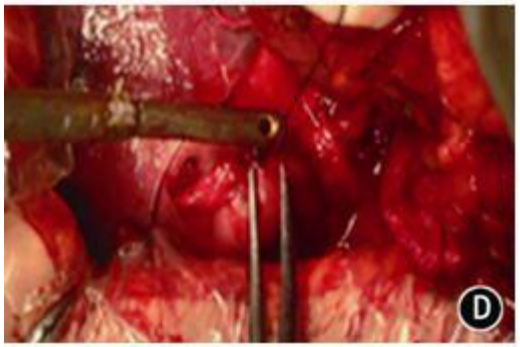
THE "NORMAL' DUODENUM: PREVENTIVE OPTIONS

APPLICATION OF PURSE –STRING SUTURE









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

Shao QS, Wang YX et al. Application of purse-string suture for management of duodenal stump in radical gastrectomy. Chin Med J 2011; 124:1018 - 21

THE ‘BLOWN” DUODENAL STUMP

PRESENTATION & DIAGNOSIS

- Rare before the 4th or 5th 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

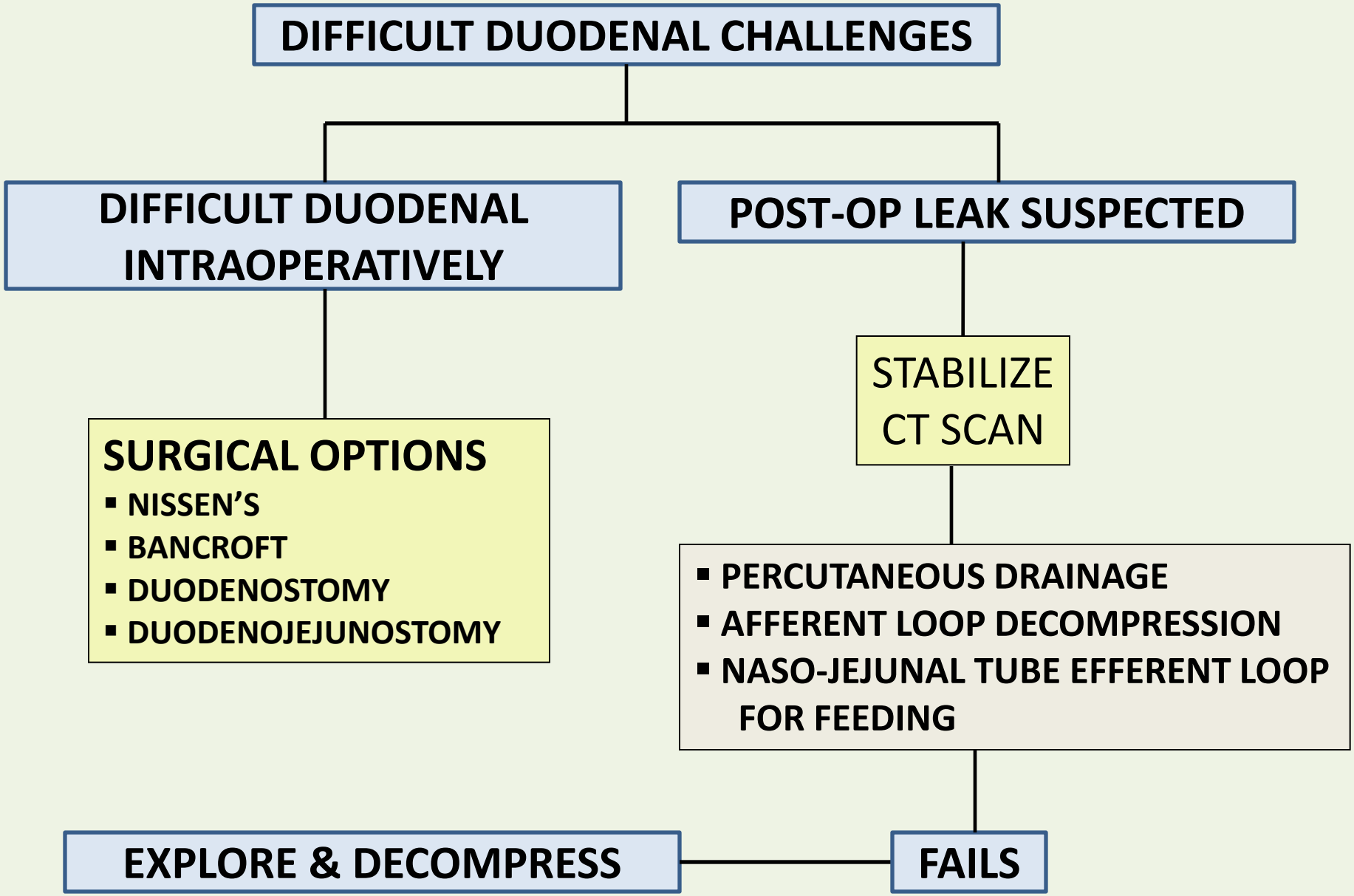
DIAGNOSIS & MANAGEMENT

- 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



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”