Review of Performance and Outcomes within HPB Services delivered at Aberdeen Royal Infirmary between 2021-2022

Introduction

This review was conducted by Professor Stephen J Wigmore, Regius Professor of Clinical Surgery, University of Edinburgh at the request of Mr Paul Bachoo and Mr David Lawrie on behalf of NHS Grampian. The scope of the review was to analyze the performance and outcomes of HPB services in NHS Grampian between 2021 and 2022, a period when the service was under enhanced scrutiny and following some changes in personnel within the HPB surgery team.

NHS Grampian offers patients with liver biliary and pancreas cancers specialist surgical services. Patients are discussed at the North of Scotland Cancer Network (NOSCAN) HPB multidisciplinary team meeting which in principle includes surgeons from Grampian, Highland and Dundee and specialists in gastroenterology, radiology, pathology, medical/radiation oncology and clinical nurse specialists. During the whole period of study a Nationally agreed pathway was in operation for all patients with suspected hepatocellular carcinoma through the Scottish Liver Transplant Unit and Edinburgh HPB service. In January 2022 a National pathway was established for referral of hilar cholangiocarcinoma and complex biliary drainage via Edinburgh. Part of the study period coincided with the COVID pandemic and due to reduced operating theatre capacity, there were instances where patients were transferred outside of NHS Grampian to undergo surgery. In some cases an NHS Grampian surgeon performed this surgery and in other cases the surgical care was delivered by the local team.

Scope and Methodology

The review was conducted by interrogating the electronic patient records using NHS Grampian Intersystems TrakCare, Sci Store documents and PACS where appropriate. The care of 60 patients in total was reviewed. These patients represented 35 pancreatic and biliary cases and 25 patients requiring liver surgery. Data on mortality were provided by the NHS Grampian HPB team. These data covered a slightly different time span from the case data and the denominators of the individual case review and the pooled data are not the same. Morbidity and mortality was classified according to the Clavien Dindo score which is a pragmatic system for grading post surgical complications based primarily on the treatment required to deal with the complication.

Clavien Dindo grading system for post surgical complications.

Grade	
1	Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic and radiological interventions. Acceptable therapeutic regimens are: drugs as antiemetics, antipyretics, analgetics, diuretics and electrolytes and physiotherapy. This grade also includes wound infections opened at the bedside.
2	Requiring pharmacological treatment with drugs other than such allowed for grade I complications. Blood transfusions, antibiotics and total parenteral nutrition are also included.
3	Requiring surgical, endoscopic or radiological intervention
3a	Intervention under regional/local anesthesia
3b	Intervention under general anesthesia
4	Life-threatening complication requiring intensive care/intensive care unit management
4a	Single organ dysfunction
4b	Multi-organ dysfunction
5	Patient demise

Morbidity and mortality

Liver Surgery

The majority of liver resections that were undertaken were minor liver resections (33 patients) with the most common type of resection being non-anatomical "atypical" resections usually of less than one liver segment. There were a number of segmental and bisegmental resections. There were 5 major liver resections involving removal of 3 or more liver segments. [1] 13 of 33 patients who underwent a minor liver resection and 2 out of 5 patients undergoing major liver resection experienced a complication of grade 1-2 (considered minor complication severity). More serious complications graded 3 or 4 occurred in 8 out of 33 patients undergoing minor liver resection and 2 out of 5 patients undergoing major liver resection. There were 2 deaths, one occurred in a patient undergoing minor liver resection the other in a patient undergoing major liver resection. The overall mortality was therefore 5/38 resections or 5.3%. Both deaths occurred within 30 days of surgery. The Scottish HPB Network upper limit of mortality for liver resection is considered to be 5% at 30 days and 7.5% at 90 days.

1The liver has 8 anatomical segments as described by Couinaud

Liver outcome data 2021-2022 NHS Grampian

	Total Cases	Minor Complications (CD 0-2)	Major Complications (CD 3-4)	90d Mortality	SHPBN QPI Data (90d target)
Minor	33	13/33	8/33 (24.2%)	1/33 (3.0%)	
Major (3+ Sg)	5	2/5	2/5 (40%)	1/5 (20%)	
All Liver	**38**	**15/38**	**10/38 (26.3%)**	**2/38 (5.3%)**	**<7.5**
Trial Dissection	**3**				

* Not included, Two x NHSG surgeon [redacted] performed Major liver resection in NHSH on NHSG patient, with no major morbidity or mortality

Analysis of mortalities

Patient A [redacted]

[redacted]

[redacted]

Patient A's death was considered unavoidable. [redacted]

Patient B

[redacted]

Patient B's death was considered avoidable [redacted].

Patient selection and clinical judgement

[redacted], **Patient C** [redacted] They recovered with

medical management but this should be considered a “near miss”. [redacted].

Technical issues

[redacted]

Patient D

Management of complications

Complications following liver surgery were managed appropriately and in a timely fashion.

Pancreas Surgery

During the period 2021-2022 16 Whipple’s procedures and 1 total pancreatectomy were undertaken in NHS Grampian. 2 of these 17 patients died postoperatively giving a 30 day and 90 day mortality of 11.8%. During the same time period 10 distal pancreatectomies or minor pancreatic resections were undertaken with no mortality. The overall mortality for pancreatic resectional surgery was 7.4% which is within the upper limit of 90 day mortality of 7.5% required by the Scottish HPB Cancer Network. Minor morbidity Clavien Dindo grade 1-2 occurred at a rate of 12/27 patients 44% and major complications Clavien-Dindo grade 3 or 4 occurred at a rate of 3/27 patients 11.1%.

	Total Cases	Minor Complications (CD 0-2)	Major Complications (CD 3-4)	90d Mortality	SHPBN QPI Data (90d targets)
Whipples	16	5/16	3/16	2/16 (12.5%)	
Total	1	0/1	0/1	0/1	
Major (Whip+Total)	**17**	**5/17**	**3/17 (17.6%)**	2/17 (11.8%)	
Minor (Distal+Other)	10	7/10	0/10	0/10	
All Pancreatic	**27**	**12/27**	**2/27**	2/ 27 **(7.4%)**	**<7.5%**
Trial Dissections	**4**				

*Not included, Five x NHSG surgeons [redacted] attended NHSH/ NHST for major pancreatic surgery on NHSG patients

Analysis of Mortalities

Patient E

[redacted]

Case Analysis

[redacted]. The assumption from the case summary provided by NHSG was that this patient died of a pulmonary embolus. [redacted]

[redacted]. In this case it would have probably have been very helpful to the family and certainly helpful to the clinical team to have had a post mortem examination.

Patient F

[redacted]

Case Analysis

[redacted]

[redacted]. This death was in my opinion potentially avoidable.

Technical issues

There were a number of pancreas resections that were associated with very high blood loss. Pancreatoduodenectomy is generally considered a procedure with low blood loss and the majority of patients would not be expected to require blood transfusion or pressor support. There were several cases with extremely high blood loss (1500-4500ml) and reading the operation notes, it was not really clear the reasons why this happened.

Failure to rescue

The majority of patients who had complications were managed appropriately. In particular there were two cases of unexpected deterioration, which prompted rapid return to theatre, washout and drainage, which I consider to represent good clinical practice. I do have some concerns around what appears to be a relatively high threshold for suspicion of post pancreatectomy haemorrhage. There are consistent patterns of complications in patients undergoing major pancreatic surgery, which demand a high index of suspicion and a low threshold for initiating investigations such as CT or invasive mesenteric angiography. Reading the details of some of the cases it would appear that the HPB team were unaware of the decline of one or two patients because of the on call arrangements and cover for these patients. Meaning that surgeons unfamiliar with pancreas surgery complications were in charge and either did not suspect a problem or did not escalate back to the HPB team in time.

Comments

There have definitely been improved outcomes compared with the analysis which I undertook previously for NHS Grampian **Review of Patient Safety Concerns within HPB Services delivered at Aberdeen Royal Infirmary 2015-2021** (September 2022). Although liver and pancreas mortality have declined they are still higher or close to the upper limit of acceptable mortality based on figures in the Scottish HPB Network QPI. The exact reasons for this improvement are unclear however the following factors may have contributed:-

- There has been a change in personnel. One surgeon has been redeployed within NHS Grampian and is no longer undertaking HPB surgery. Another surgeon is on long-term leave.
- Through 2021-2022 the HPB service has been run predominantly by two surgeons who have also undertaken dual consultant operating for the critical periods of operative procedures and provided support for each other.
- There have been several instances where patients with potentially serious complications have been "rescued" through expedient intervention from the HPB team. These interventions undoubtedly reduced the impact of these complications.
- There has been more obvious involvement of Regional MDT in patient selection and also some consultation with national centres or the national neoadjuvant chemotherapy meeting.

Areas of concern

1. There are a number of patients who should have been referred to the National Hepatocellular carcinoma service for MDT decision. One patient who had HCC with cirrhosis and underwent surgery for a suspected HCC with 2700ml of blood loss and subsequent liver failure (survived) should definitely have been transferred for surgery to Edinburgh in my opinion. The purpose of the National HCC pathway is to standardize opportunities and care for patients across Scotland and often patients are referred back to their home Health board for local care. The problem with not following this pathway is that if a patient has a serious complication and they have not been appropriately referred it makes it difficult to defend.
2. Technical concerns. The blood loss of a number of pancreatic and liver resections is extremely high and may be influencing patient recovery and outcomes. The exact reasons for this are unclear but may be possible to address.
3. Case volume. NHS Grampian has a relatively small case volume with approximately 15 pancreatic resections and 20-25 liver resections per annum. This is not a problem just for NHSG but also for NHS Highland and NHS Tayside who also offer HPB services but have small catchment populations and numbers. The small case volume impacts negatively on surgeon technical experience as well as team management of patients and recognition and intervention for complications. I am not sure an HPB service is sustainable based on current numbers but if a centralized North of Scotland HPB service was located in NHS Grampian this would be an opportunity to improve all aspects of care. HPB surgical training is very difficult in the context of low volume surgery.

4. On call cover for patients. The present arrangements for care mean that the emergency on call surgery service is called to manage a deteriorating HPB patient. The medical model that is employed is not dissimilar to that in other services but involves a stepwise escalation of concern from foundation year doctor to registrar to on call consultant who may be from a completely different specialty. This inevitably takes some time and may mean that pattern recognition of complications may not occur due to unfamiliarity with these specific procedures. It may be that deterioration of an HPB patient in the context of the early postoperative period needs a different pathway that alerts an expert earlier even if only for advice.



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