

ROLE OF MDCT IN DETECTING PATTERNS OF RECURRENCE AFTER WHIPPLE PROCEDURE IN FOLLOW-UP OF PANCREATIC MALIGNANCY

M. Umar Amin, Rashed Nazir

Radiology and Imaging Department, Shifa International Hospital, Islamabad, Pakistan

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ABSTRACT

OBJECTIVE: The aim of the study was to identify recurrent sites of pancreatic cancer on Multidetector CT (MDCT) in follow-up of pancreatic cancer surgery (Whipple procedure). **METHODOLOGY:** This was retrospective case series conducted in Radiology and imaging department, Shifa International Hospital, Islamabad from June 2010 to June 2013. Total 42 patients were recruited who underwent CT for follow-up of tumor recurrence after Whipple procedure for pancreatic malignancy from June 2010 to June 2013. Their CT reports were reviewed and sites of recurrence were evaluated. **RESULTS:** Out of 42 patients, 33 (67.65%) were male and 9 (32.35%). Age ranged from 18 to 70 years with mean age of 26 years. Mean follow up period ranged from 5 to 26 months. Tumor recurrence was seen in 32 patients. Local recurrence was the most common type of recurrence, (n=21 cases %) followed by combined local, hepatic and nodal recurrence (n= 9). Superior mesenteric artery (SMA) was the most common vessel involved in local recurrence 80%, either alone (56%) or in combination with other vessels, superior mesenteric vein (SMV), splenic vein, portal vein or celiac trunk. Tumor marker CA 19-9 was raised in all the patients with a range of 80 to 600. **CONCLUSION:** Multidetector CT performed with standard protocol in follow up of patients after Whipple procedure is an optimal method for detecting tumor recurrence. Local recurrence alone or in combination with metastatic disease in nodes and liver is seen in most cases. Low Incidence of isolated lung and hepatic recurrence was seen in post-Whipple follow up.

Key words: Multidetector CT angiography, Whipple, Recurrence.

Introduction

Surgical resection is only possible in 20% of patients with pancreatic adenocarcinoma with overall 5-year survival rate being only 25%.¹ Over the past decade, performance of the Whipple procedure, or pancreatoduodenectomy, to treat malignant pancreatic disease has increased. This increase is in large part due to the decreasing perioperative mortality rate, which is down from historic highs of 25% to the 1.0% - 1.5% now achieved in large centers. Although advances in surgical management have improved the outlook

for patients undergoing pancreatoduodenectomy, the improving mortality rate is also in part attributed to improvements over the past 2 decades in cross-sectional imaging.²

For those patients who present with resectable pancreatic cancer, the Whipple procedure provides a significant increase in survival. Careful interpretation of the post operative CT examinations is essential, to detect post operative complications and early recurrent disease.³

Worldwide survival data for ductal adenocarcinoma of the pancreas are the lowest among the 60 most

Correspondence : Dr. M. Umar Amin
Radiology and Imaging Department,
Shifa International Hospital,
Islamabad, Pakistan
Email: umaramin71@gmail.com

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frequent types of organ cancers.³ Pancreatic malignancy is a disease with a poor survival after whipples procedure. Local recurrence after resection is frequently seen within 2 years for most patients.⁴ Follow-up CT studies had been performed every 3-6 months after surgery; however, the specific follow-up intervals varied from patient to patient. Precise interpretation of postoperative tumor recurrence can contribute to planning treatment, monitoring its efficacy, and estimating the patient's prognosis.⁵

A major problem in patients with pancreatic cancer is that extensive postoperative changes with scar tissue formation as well as lymph node enlargement are present after surgical therapy that may be mistaken for disease recurrence.⁶ Accurate interpretation of Dynamic MDCT requires knowledge of the type of surgery performed and the normal appearance of the abdomen on CT following this complex surgery.⁷

So far there have not been many imaging studies in the literature focusing on detection of pancreatic cancer recurrence. One reason may be that recurrence of pancreatic cancer was not treated, but in recent year's radiochemotherapy and, in rare cases, surgery for local recurrence has been advocated.⁸

The aim of the study was to identify recurrent sites of pancreatic cancer on MDCT in follow-up of after Whipple's procedure.

Material and Methods

This retrospective study was performed at the Radiology and Imaging department, Shifa International hospital, Islamabad. This study was approved by the local ethics committee. A total of 42 patients who had underwent Whipple procedure for primary malignant tumor of the pancreatic head /Ampullary Ca from June 2010 to June 2013 were included in the study. The CT reports were reviewed by two radiologists. Disease recurrence was classified into local recurrence, lymph node recurrence, liver, lung and peritoneal metastasis. For each case, tumor recurrence could either appear as a single finding

such as local recurrence, or as a combination, e.g. local recurrence and liver metastasis concurrently on follow-up imaging. Statistical analysis was performed on SPSS version 13.

Results

Out of 42 patients, 33 (67.65%) were male and 9 (32.35%). Age ranged from 42 to 70 years with mean age of 26 years. Tumor recurrence was seen in 32 patients (Fig. 1). Mean follow up period ranged from 5 to 26 months (Fig. 2). Tumor marker CA 19-9 was raised in all the patients with a range of 80 to 600 (Fig. 3)

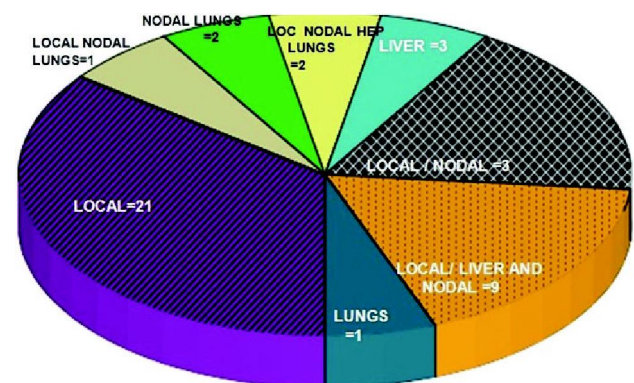


Figure 1: Types of recurrence based on CT findings

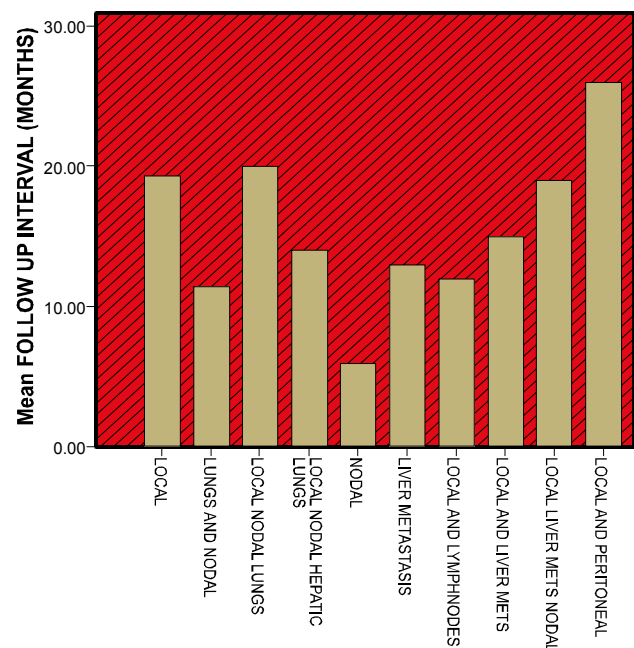


Figure 2: Mean follow up interval in different types of recurrences

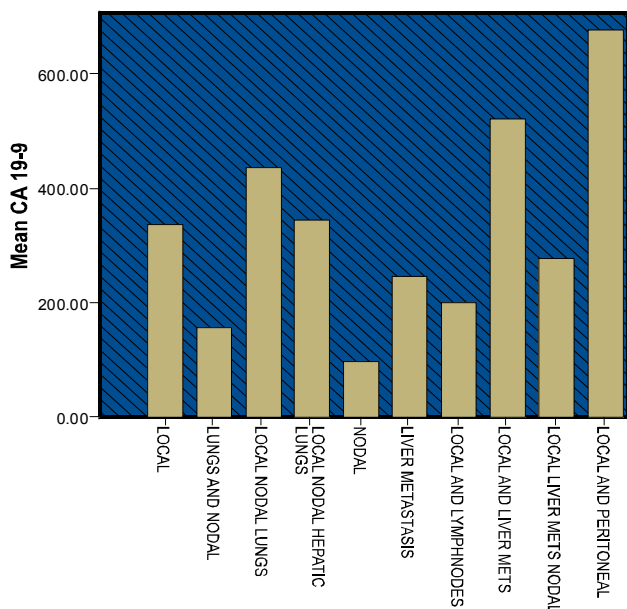


Figure 3: Values of tumor marker CA 19-9 in different types of recurrences

Local recurrence was the most common type of recurrence, (n=21 cases %) followed by combined local and nodal recurrence (n= 9). Superior mesenteric artery (SMA) was the most common vessel involved in local recurrence 80%, either alone (56%) or in combination with other vessels, superior mesenteric vein (SMV), splenic vein, portal vein or celiac trunk (Fig. 4).

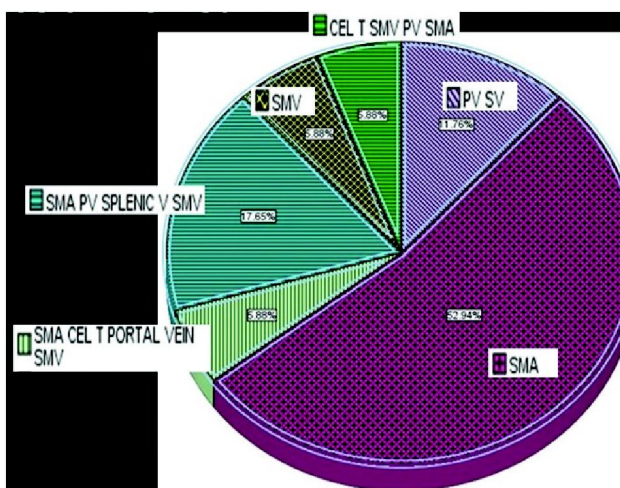


Figure 4: Involvement of vessels in local recurrence

Discussion

High-quality multidetector computed tomography (MDCT) is currently the best method of investigation after radical pancreaticoduodenectomy (Whipple procedure).⁹

Our study demonstrated that a specific pattern of disease recurrence in pancreatic cancer exists, especially of local recurrence, and that regular follow-up CT examinations are able to identify such patients (Fig. 5). The increase in tumor marker (CA 12-5) also corresponds to disease recurrence.

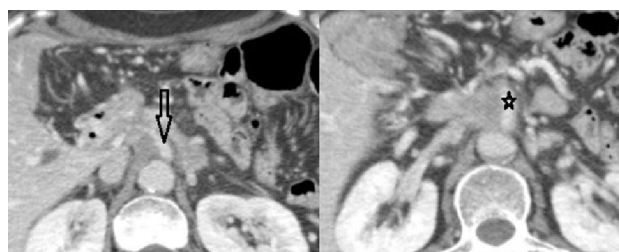


Figure 5: Local Tumor recurrence. Solid mass can be seen surrounding the celiac trunk (Open arrow) and SMA (asterisk)

Local tumor recurrence was the most common pattern in our study. This was in accordance with the study performed by Tobias Heye et al. who demonstrated this pattern in 65% of their study group.² The pattern demonstrates that pancreatic cancer reoccurs mainly along the cardinal neurovascular structures such as the superior mesenteric artery and hepatic artery. This is the same propagation pattern as the primary pancreatic cancer exhibits during tumor extension. It is essential to identify tumor recurrence early in order to offer patients further disease controlling measures or potentially curative options.

The case for follow-up imaging is to identify tumor recurrence as early as possible in order to intervene appropriately. A major problem is that extensive postoperative changes, such as scar tissue formation, and enlarged and increased lymph nodes in the resection area are difficult to distinguish from real tumor relapse.¹⁰ Soft tissue encasing the peripancreatic vessels or within the mesentery is often seen during the postoperative period and may have an identical appearance to postoperative inflammatory changes.¹¹ We in our study relied on ancillary clues to recurrent disease which included a history of positive margins, an elevated CA-19-9, an increase

in size of the soft tissue mass or a newly appearing soft tissue mass outside of the perioperative period. Tumor in the pancreatic bed due to recurrence can invade adjacent jejunal loops and cause obstruction.¹² However, this pattern was not seen in any of our patients.

Conclusion

Multidetector CT performed with standard protocol in follow up of patients after Whipple procedure is an optimal method for detecting tumor recurrence. Local recurrence alone or in combination with metastatic disease in nodes and liver is seen in most cases. Low Incidence of isolated lung and hepatic recurrence was seen in post - Whipple follow up.

References

1. Ducreux M, Boige V, Goéré D, Deutsch E, Ezra P, Elias D, Malka D. The multidisciplinary management of gastrointestinal cancer. Pancreatic cancer: from pathogenesis to cure. *Best Pract Res Clin Gastroenterol.* 2007; **21(6)**: 997-1014.
2. Debra A. Gervais, Carlos Fernandez-del Castillo, Mary Jane O'Neill, Peter F. Hahn, MD, Peter R. Mueller. Complications after Pancreatoduodenectomy: Imaging and Imaging-guided Interventional Procedure. *RadioGraphics* 2001; **21**: 673-90.
3. Yeo CJ, Cameron JL, Sohn TA et al. Six Hundred Fifty Consecutive Pancreatoduodenectomies in the 1990s: Pathology, Complications and Outcomes. *Annals of Surgery* 1997; **226(3)**: 248-60.
4. Carpelan-Holmström M, Nordling S, Pukkala E, Sankila R, Lüttges J, Klöppel G, Haglund C. Does anyone survive pancreatic ductal adenocarcinoma? A nationwide study re-evaluating the data of the Finnish Cancer Registry. 2005; **54**: 385-7.
5. Tobias Heye, Nicola Zausig, Miriam Klauss, Reinhard Singer, Jens Werner, Götz Martin Richter, Hans-Ulrich Kauczor, Lars Grenacher. CT diagnosis of recurrence after pancreatic cancer: Is there a pattern? *World J Gastroenterol* 2011; **17**: 1126-34.
6. Kousei Ishigami, Kengo Yoshimitsu, Hiroyuki Irie, Tsuyoshi Tajima, Yoshiki Asayama, Masakazu Hirakawa, Daisuke Kakihara, Yoshiyuki Shioyama, Yunosuke Nishihara, Koji Yamaguchi, Hiroshi Honda. Significance of perivascular soft tissue around the common hepatic and proximal superior mesenteric arteries arising after pancreaticoduodenectomy: evaluation with serial MDCT studies. *Abdom Imaging* 2008; **33**: 654-61.
7. Lepanto L, Gianfelice D, Déry R, Dagenais M, Lapointe R, Roy A. Postoperative changes, complications, and recurrent disease after Whipple's operation: CT features. *AJR Am J Roentgenol* 1994; **163**: 841-6.
8. Johnson PT, Curry CA, Urban BA, Fishman EK. Spiral CT following the Whipple procedure: distinguishing normal postoperative findings from complications. *J Comput Assist Tomogr.* 2002; **26**: 956-61.
9. Smith SL, Hampson F, Duxbury M, Rae DM, Sinclair MT. Computed tomography after radical pancreaticoduodenectomy (Whipple's procedure). *Clin Radiol.* 2008; **63**: 921-8.
10. Wilkowski R, Thoma M, Bruns C, Dühmke E, Heinemann V. Combined chemoradiotherapy for isolated local recurrence after primary resection of pancreatic cancer. *JOP* 2006; **7**: 34-40.
11. Barkin JS, Goldstein JA. Diagnostic approach to pancreatic cancer. *Gastroenterol Clin North Am* 1999; **28**: 709-22.
12. Coombs RJ, Zeiss J, Howard JM et al. CT of the Abdomen After the Whipple Procedure: Value in Depicting Postoperative Anatomy, Surgical Complications, and Tumor Recurrence. *AJR* 1990; **154**: 1011-4.