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# Carcinoid tumors of the appendix-our experience in Garhwal region of Uttarakhand

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**Abstract**

**Objective**: To calculate the incidence of incidently discovered carcinoids among all appendisectomy cases and compare the experience with the recent literature on the subject.

**Material and methods**: The medical records of all the patients who underwent consecutive appendectomies and were referred to pathology department for biopsy in Veer Chandra Garhwali institute of medical sciences, Srinagar were retrospectively analyzed. Detailed medical history was noted age, gender, indication for surgery, surgical procedure, tumor localization in the appendix, diameter of the lesion after fixation with formaldehyde, concomitant appendicitis, the need for extended surgery and follow up were reviewed in detail

**Result**: Out of the total 1152 patients, 4 (0.4%) were found to histological evidence of carcinoid tumor of the appendix. There were 3 female and 1 male patients with a mean age of 29.2 years (range: 6-82 years). Acute appendicitis was the clinical presentation for all patients. Open appendectomy was performed in all four patients. Histologically, all tumors were located at the tip of the appendix with a mean diameter of 0.6cm (range: 0.3-1.0 cm).All** patients were alive and disease-free during a mean follow-up of seven years (range: 4-7 yrs)

**Conclusion:** Carcinoid tumors of the appendix are extremely rare and invariably remain asymptomatic and are mostly discovered incidently for appendicectomy done for other reasons.

**Keywords:** carcinoid, appendix, acute appendicitis

## Introduction

Carcinoid are neuroendocrine tumours derived chiefly from enterochromaffin cells. They are capable of amine precursor uptake and decarboxylation (APUD cells [1]. Carcinoid tumours were first reported by Otto Lubarsch in 1888 [2]. "Karzinoid" is a word was first used by Obemdorfer in 1907 to explain a tumor behaving in a fashion that is more benign than Malignant [3]. Carcinoids of the appendix are rare occurring in approximately 0.3 to 0.9% of specimens from appendisectomy [4]. They are commonly seen in the third to fifth decade [5]. Appendiceal carcinoid tumor lacks specific clinical features and its clinical presentation may not differ from that of acute appendicitis. It is usually diagnosed incidentally during surgery for acute appendicitis and occasionally during other abdominal procedures (colectomy, cholecystectomy, salpingectomy) [6].

## Material and methods

WE report here a series of 4 appendiceal carcinoid tumors found during appendisectomy in a single centre and compared this experience with the recent literature on this subject. A retrospective study of all appendicectomies performed in three year i.e. from July 2011 to June 2014 in department of surgery of our institute and referred to pathology department for histopathological examination. Detailed medical history was noted age, gender, indication for surgery, surgical procedure, tumor localization in the appendix, diameter of the lesion after fixation with formaldehyde, concomitant appendicitis, the need for extended surgery and follow up were reviewed in detail.

A total of 1152 patients underwent appendectomy during the study period (991 for acute appendicitis or appendicular syndrome and 246 during other abdominal procedures).

Out of these 1152 patients, 4 (0.4%) were found to histological evidence of carcinoid tumor of the appendix.

There were 3 female and 1 male patients with a mean age of 29.2 years (range: 6-82 years). Acute appendicitis was the clinical presentation for all patients. Symptoms of carcinoid syndrome (flushing or diarrhea) or Cushing's syndrome [7, 17] were not described in any of these patients. Open

appendectomy was performed in all 4 patients. Histologically, all tumors were located at the tip of the appendix with a mean diameter of 0.6cm (range: 0.3-1.0 cm). All patients were alive and disease-free during a mean follow-up of 7 years (range: 4-7 yrs). Our results are summarized in Table 1.

**Table 1:** Clinical characteristics of patients with carcinoid tumors

| Serial no. | Sex | Age | Complains | location | Procedure done |
|---|---|---|---|---|---|
| 1 | F | 28 | Acute abdominal pain | Tip of appendix | Appendisectomy plus resection of mesoappendix |
| 2 | F | 35 | Insidious pain since 2 months and acute abdomen | Tip of appendix | Appendisectomy |
| 3 | M | 40 | Acute abdomen | Tip of appendix | Appendisectomy |
| 4 | F | 33 | Acute abdominal pain | Tip of appendix | Appendisectomy plus resection of mesoappendix |

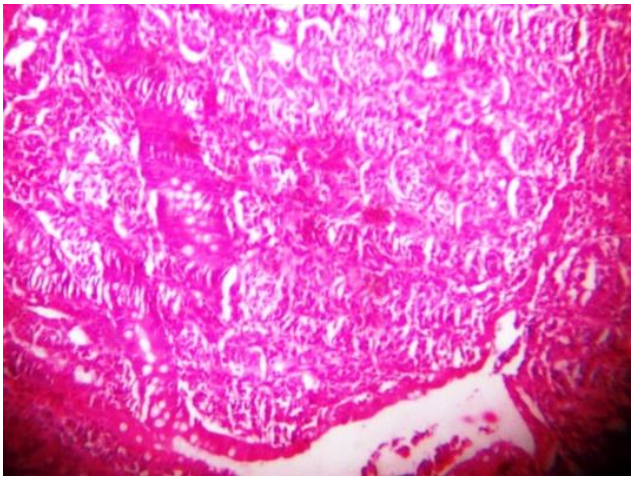

**Fig 1:** Microphotograph (10x) showing nests of tumour cells.

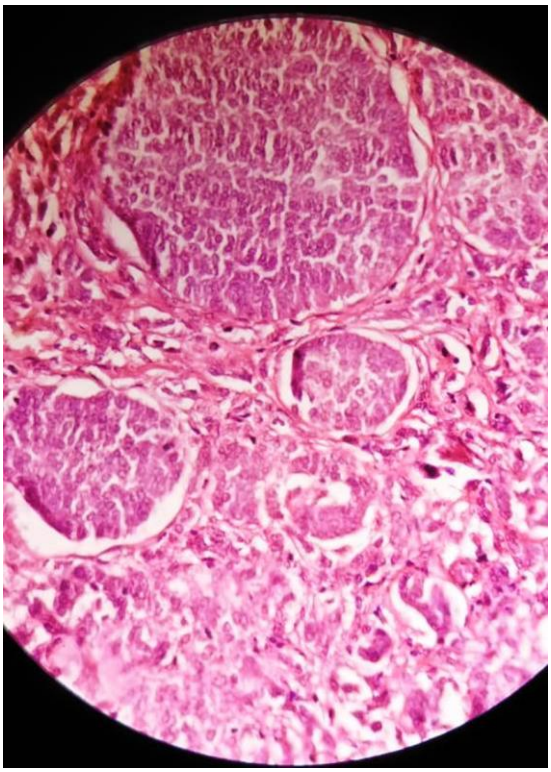

**Fig 2:** Microphotograph (40x) showing nests of tumour cells with nucleus having open chromatin with salt and pepper appearance.

## Discussion

Carcinoid tumors are considered as the most challenging tumors in clinical practice as they remain typically undiagnosed preoperatively, an observation consistent with the results of our series where all the detected cases were incidently discovered and confirmed during histological analysis of appendisectomy cases [7]. It accounts for 32%-57% of all appendiceal tumors [8] in patients with a reported mean age of 42 years [9]. Rate of occurrence of carcinoid in all cases of appendisectomy was 0.3% and the surgical indications that led to the discovery of a carcinoid tumor of the appendix were mainly appendicitis both the things were consistent with the study of moertal *et al*. [10].

Seventy to ninety percent of all appendiceal carcinoids are £1 cm in diameter, 4-25% are 1-2 cm, and few are 2 cm [11].

Appendiceal carcinoid tumor exhibits little metastatic potential and therefore rarely presents with metastases [11, 12]. Characteristics of the tumor predicting aggressive behaviour include size, histological subtype and mesoappendiceal involvement [13]. The calculated risk of metastasis from tumors ≤ 1 cm is zero, while a definite increase of risk occurs with tumor size ≥ 2 cm, the rate of metastasis ranges from 20% [13] to almost 85% [14].

In the present study, all the tumours were less than 1cm (mean diameter of 0.6 cm) and localized at the tip of the appendix with no evidence of regional or distant metastases. Carcinoid syndrome is rarely found in pediatric patients, although these phenomena have been described in cases of carcinoid tumors of the appendix in other reports [15].

Carcinoid syndrome occurs in less than 10% of patients with carcinoid tumor [16].

These are caused by vasoactive substances such as 5-hydrotryptophan (5-HIAA), histamine, bradykinin and serotonin that are produced by tumor cells. Because these substances are metabolized during their first passage through the liver, gastrointestinal carcinoids do not cause carcinoid syndrome unless they are metastatic to the liver and ovary [17].

Masson *et al*. [18] were the first to demonstrate that appendix carcinoids are derived from a proliferation of Kultschitzky cells. Neuroendocrine cells related to these enterochromaffin cells that were found in the gastrointestinal tract and associated with carcinoid tumors were subsequently found in the bronchopulmonary tree. There, where they form part of a histological spectrum that includes small cell lesions (which have the most malignant biological behavior), typical carcinoids (which have the most benign behavior) and atypical carcinoids [19]. Approximately90% of carcinoid tumors are typical tumors [20]. Plasma chromogranin A is the currently available most accurate blood marker, with its level raised in 80%-100% of neuroendocrine tumor patients [21, 22]. Other

investigations include 24-h urinary levels of 5-hydroxyindoleacetic acid, computed tomography and 111In-labelled octreotide scintigraphy microscopically, classic carcinoid tumours are formed by solid nests of small monotonous cells with occasional acinar or rosette formations and rare mitotic figures [23]. Another striking feature of the carcinoid tumors is the intense desmoplasia which may lead to vascular occlusion secondary to anatomic distortion caused by the surrounding tissue reaction [24]. Two types of silver staining, argyrophilic and argentaffin, are commonly used to identify neuroendocrine cells. Classically the foregut and hindgut carcinoids are argyrophilic, and midgut serotonin secreting midgut lesions are argentaffin [25]. Appendectomy is the therapy of choice. More aggressive surgical treatment with cecalor ileocecal resection may be indicated for treating large tumors. Right hemicolectomy should be limited to restricted cases and surgery should be performed only when either the line of resection is not tumor-free or the tumor has already metastasized to local lymph nodes. Although curative therapy has not yet been defined for metastatic patients, octreotide and its synthetic analogs may reduce the symptoms of carcinoid syndrome [25].

## Conclusion

Carcinoid tumors of the appendix are extremely rare and invariably remain asymptomatic and are mostly discovered incidently for appendicectomy done for other reasons. CT was diagnosed on histological examination of the removed appendix. The site and the size of the tumours rather than the depth, are used for the assessment of the CT. Localized disease has an excellent prognosis. Patients with metastatic CT fare poorly. Single appendicectomy is considered the appropriate treatment, while right colectomy is indicated in tumour larger than 2 cm.

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