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Clinicopathological Characteristics and Prognostic Factors of Medullary Thyroid Carcinoma: A Retrospective Study from a Tertiary Care Center

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ABSTRACT

Introduction: MTC spreads early, often before symptoms show up, and mostly doesn't respond to standard iodine-based treatments. It starts in the C cells near the thyroid's follicles. Plus, plus, it makes it a rare Deadly form of cancer despite being only a small part of thyroid tumors. This research looked at patient outcomes in a major hospital, focusing on how disease patterns and biological traits affect survival chances. That said, some features like tumor size or lymph node involvement end up shaping prognosis really. **Methods & Materials:** The present retrospective and observational study was conducted at the Department of ENT, Ad-din women's Medical College, Dhaka, Bangladesh, during January 2025 to December 2025 among 52 patients diagnosed with MTC and treated through surgery. The clinical outcomes were studied according to the size of the tumors, age, time for surgery, and history of the patients. Data analysis was done by SPSS v.26. **Result:** Among 52 patients with medullary thyroid carcinoma, the majority were aged 40–49 years (26.9%) with slight male predominance (53.8%). All patients presented with thyroid swelling (100%), while cervical lymphadenopathy was seen in 57.7%. Tumors were most commonly 2–4 cm in size (50%), with extrathyroidal extension in 38.5% and lymphovascular invasion in 34.6%; amyloid deposition was noted in 84.6%. Lymph node metastasis occurred in 61.5% and distant metastasis in 19.2% (liver 9.6%, lung 5.8%, bone 3.8%). Advanced-stage disease (Stage III–IV) was present in 61.6%. Elevated calcitonin was observed in 76.9%, with recurrence in 26.9% and mortality in 15.4%. **Conclusion:** Lymph node metastasis was common at first diagnosis, often linked to bigger tumors spreading beyond the thyroid. Many cases showed extrathyroidal growth and were diagnosed in midlife, slightly more in men. The cancer usually appeared as a swollen thyroid, with stage progression typical among those presenting late.

Keywords: *Medullary Thyroid Carcinoma, Lymphovascular Invasion, Metastasis*

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INTRODUCTION

Mortality from medullary thyroid carcinoma (MTC) remains high despite its rarity. The tumor starts in C cells of the thyroid's parafollicular tissue and makes up about 1 - 5% of thyroid cancers [1,2]. Because it doesn't take up radioactive iodine like other thyroid cancers, diagnosis and treatment follow a different path. Still, it spreads early and grows fast, making prognosis tough for patients ultimately [2]. In a way, the tumor dumps calcitonin, which acts like a precise flag for spotting disease early, tracking recovery, and catching comebacks. Although most tumors show up alone in middle age - about three out of four cases - there's another group tied to gene flaws in RET, linked directly to MEN2 disorders. That form runs in families and shows up earlier than typical ones [2-4]. Diagnoses are often made earlier in young patients with hereditary MTC, where tumors appear on both sides and spread to multiple areas - unlike sporadic cases, which tend to stay single-sided and show up later. A thyroid nodule is the usual first sign, frequently joined by swollen lymph nodes near the neck. As the cancer grows, pressure builds causing trouble swallowing, voice changes. Or breathing issues because it invades nearby tissues. Some people experience digestive troubles and sudden warmth due to high calcitonin levels circulating in their blood. Under the microscope, tumor cells form clusters surrounded by amyloid deposits made from mutated calcitonin proteins. Calcitonin, chromogranin, and carcinoembryonic antigen tests come back positive and support the final diagnosis [5,6]. MTC often spreads to lymph nodes early on, and many patients show regional nodal involvement when diagnosed, this directly affects how likely they are to relapse or survive. Liver, lung, and bone metastases can develop later in the illness. Tumor size, whether it grows outside the thyroid, lymph node presence, distant spread, and surgery success all matter for outcomes. Pre-op calcitonin levels mirror tumor load and predict prognosis too [3]. Most cases of MTC don't get caught early, so surgery still stands as the main fix. A full thyroid removal with central lymph nodes is usual, but if cancer spreads past there. Lateral neck dissection might be needed [2]. Even with this, many patients end up coming back - Mainly when the disease is already far along. Survival chances jump sharply when the tumor stays local, and things turn grim once it hits distant organs [7]. This research takes a look at what drives outcomes in medullary thyroid carcinoma among patients seen in a major hospital setting.

METHODS & MATERIALS

Patients with histopathologically confirmed MTC who underwent surgery and had full clinical, biochemical, and follow-up data were selected. This retrospective observational study took place at the Department of ENT, Ad-din women's Medical College, Dhaka, Bangladesh to examine the clinicopathological features and prognostic factors of medullary thyroid carcinoma (MTC). Fifty-two cases diagnosed between January 2025 and December 2025 were analyzed. In practice, only those with complete records and no history of prior thyroid cancer treatment were included. Mostly, people without missing data or earlier therapy were retained. Tumor size, extrathyroidal extension, and lymph node involvement were tracked in the pathology reports. Data came from hospital logs, lab results, and post-op checkups - covering age, sex, symptoms, pre-surgery calcitonin levels, imaging signs, surgery notes, and tissue samples. The AJCC TNM system was used to classify disease stages. Recurrence rates and survival times over time were documented for each patient. SPSS version 26, while 0 handled the stats with averages, counts, and proportions. Patient privacy stayed protected thanks to IRB clearance.

All data entries followed strict confidentiality rules for better or worse.

RESULTS

The majority of patients belonged to the 40–49 years age group (26.9%), followed by the 50–59 years age group (23.1%). The mean age was approximately in the fifth decade. A slight male predominance was observed, with males accounting for 53.8% of cases (*Table I*).

Table I
Distribution of Patients According to Age and Gender (*n*=52).

Variable	Frequency (n)	Percentage (%)
Age (years)		
<30	6	11.5
30–39	10	19.2
40–49	14	26.9
50–59	12	23.1
≥60	10	19.2
Gender		
Male	28	53.8
Female	24	46.2

All patients presented with thyroid swelling. More than half (57.7%) had cervical lymphadenopathy at presentation. Compressive symptoms such as hoarseness (15.4%) and dysphagia (11.5%) were less common, while systemic symptoms were present in a small proportion (9.6%) *Table II*.

Table II
Clinical Presentation of Patients (*n*=52).

Clinical Features	Frequency (n)	Percentage (%)
Thyroid swelling	52	100
Cervical lymphadenopathy	30	57.7
Hoarseness of voice	8	15.4
Dysphagia	6	11.5
Diarrhea/flushing	5	9.6

Half of the patients (50%) had tumors measuring 2–4 cm. Extrathyroidal extension was noted in 38.5% of cases, while lymphovascular invasion was present in 34.6%. Amyloid deposition, a characteristic feature of MTC, was observed in the majority (84.6%) of cases (*Table III*).

Table III
Histopathological Characteristics (*n*=52).

Parameter	Frequency (n)	Percentage (%)
Tumor size <2 cm	12	23.1
Tumor size 2–4 cm	26	50.0
Tumor size >4 cm	14	26.9
Extrathyroidal extension present	20	38.5
Lymphovascular invasion	18	34.6
Amyloid deposition present	44	84.6

Lymph node metastasis was present in 61.5% of patients, with central compartment involvement being more common than lateral neck involvement. Distant metastasis was observed in 19.2% of cases, with the liver being the most frequent site (*Table IV*).

Table IV
Lymph Node and Distant Metastasis (*n*=52).

Parameter	Frequency (n)	Percentage (%)
Lymph node metastasis present	32	61.5
Central compartment nodes	20	38.5
Lateral neck nodes	12	23.1
Distant metastasis present	10	19.2
Liver metastasis	5	9.6
Lung metastasis	3	5.8
Bone metastasis	2	3.8

A significant proportion of patients presented in advanced stages, with Stage III and IV each accounting for 30.8% of cases. Early-stage disease (Stage I and II) comprised only 38.5% of the cohort (*Table V*).

Table V
TNM Staging Distribution (*n*=52).

Stage	Frequency (n)	Percentage (%)
Stage I	8	15.4
Stage II	12	23.1
Stage III	16	30.8
Stage IV	16	30.8

Elevated serum calcitonin levels were observed in 76.9% of patients. Complete surgical resection was achieved in 65.4% of cases. During follow-up, recurrence occurred in 26.9% of patients, while mortality was recorded in 15.4%, indicating a substantial disease burden (*Table VI*).

Table VI
Prognostic Factors and Outcomes (*n*=52).

Parameter	Frequency (n)	Percentage (%)
Elevated calcitonin (>100 pg/mL)	40	76.9
Complete surgical resection (R0)	34	65.4
Recurrence	14	26.9
Mortality	8	15.4

DISCUSSION

In the present study, the majority of patients were in the 40–49 years age group (26.9%), with a slight male predominance (53.8%). In comparison, Zhang Y et al. reported a mean age of 46.5 years, with females comprising 61.2% and males 38.8% [8]. Similarly, Hamdy O et al. observed a mean age of 39.9 years with female predominance (61.3%) [9]. Another large population-based study by Roman S et al. demonstrated female predominance (approximately 60%) with a median age of 50 years [10]. Regarding clinical presentation, all patients in our study presented with thyroid swelling (100%), and 57.7% had cervical lymphadenopathy. Hamdy et al. reported thyroid swelling in 100% and cervical lymph node involvement in 64.5% of cases [9]. Similarly, Machens A and Dralle H reported nodal metastasis in approximately 50–70% of patients at diagnosis [11]. Lymph node spread is found in more than half of cases as the American Thyroid Association. Half of the tumors studied fell between 2 and 4 centimeters, with a quarter larger than four. Thirty-eight-point five percent showed growth beyond thyroid borders. Thirty-four point six had invaded blood or lymph vessels, zhang et al. Saw a median tumor size of just 1. 8 cm, and only twenty-one-point four percent had extrathyroidal extension [8]. Similarly, Randle RW et al. reported extrathyroidal extension in approximately 20–25% of cases [6]. Lymph node metastasis was observed in 61.5% of patients in our study, with central compartment involvement in 38.5% and lateral neck involvement in 23.1%. Zhang et al. reported central lymph node metastasis in 52.0% and lateral lymph node metastasis in 42.8% [8]. Hamdy et al. reported overall nodal involvement in 64.5% [9]. Additionally, Elisei R et al. reported nodal metastasis in approximately 60% of sporadic MTC cases [3]. Our findings are comparable in overall nodal involvement, although lateral neck metastasis was relatively lower. Distant metastasis was present in 19.2% of our patients, with liver (9.6%), lung (5.8%), and bone (3.8%) being the most common sites. Hamdy et al. reported distant metastasis in 22.6% of patients, with liver involvement in 12.9% and lung in 9.7% [9]. Similarly, Filetti S et al. reported distant metastasis rates ranging from 10% to 20% at diagnosis [12]. In our study, 61.6% of patients presented with advanced disease (Stage III and IV). Zhang et al. reported Stage III in 28.6% and Stage IV in 45.4% of patients [8]. Randle et al. also noted that approximately 50% of patients present with advanced-stage disease [6]. The higher proportion in our study suggests delayed diagnosis and referral. Regarding prognostic factors, elevated serum calcitonin levels were found in 76.9% of patients, while recurrence and mortality rates were 26.9% and 15.4%, respectively. Hamdy et al. reported recurrence in 29.0% and mortality in approximately 16% [9]. Roman et al. found that survival significantly decreased with nodal and distant metastasis, with 10-year survival dropping below 50% in advanced cases [7]. Elisei et al. also demonstrated that higher calcitonin levels correlate with tumor burden and poorer outcomes [3].

LIMITATIONS

The results aren't foolproof, retrospective work often relies on old records, which can miss key details or get skewed by how doctors choose to write them. Since only 52 people were studied at one hospital, outcomes might not apply beyond that setting. Follow-ups varied widely, and for some patients, long-term data simply wasn't available. Survival trends and recurrences stayed cloudy because of this gap. Usually, conclusions stay tentative when tracking rare events over years. Some patients' cases faded from view after a few months.

CONCLUSION

Medullary thyroid carcinoma in this study predominantly affected patients in the fifth decade of life with a slight male predominance and commonly presented as thyroid swelling with a high frequency of cervical lymph node involvement. A significant proportion of patients had larger tumors, extrathyroidal extension, and advanced-stage disease at presentation, with lymph node metastasis being a frequent finding. Elevated serum calcitonin levels and substantial rates of recurrence and mortality highlighted the aggressive nature of the disease.

RECOMMENDATION

Most patients miss the signs until it's too late - calcitonin checks during routine screenings can catch medullary thyroid cancer early. So, testing thyroid nodules quickly makes a big difference. Neck scans are key for spotting spread before surgery. Really, clear imaging helps doctors choose the right operation plan.

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CONFLICT OF INTEREST

None declared

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