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Study of Cytomorphological Features Of Mass Lesions From Nonthyroidal Head and Neck Region

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Abstract
Fineneedle aspiration cytology (FNAC) is a procedure in which a fine needle is used to remove a sample of cells from a suspicious mass for diagnostic purposes. To study of cytomorphological features of mass lesions from nonthyroidal head and neck region. This prospective study of FNAC was conducted on 262 patients over a period of 1.5 years i.e. from Jan 2022 to July 2023. The overall incidence of FNAC of head and neck masses in our institution was 33.75% of all FNACs. In our study males predominated with male to female ratio of 1.84:1. Benign lesions were more common comprising of 166 (63.36%) cases than malignant lesions which comprised of 79 (30.16%) cases of all head and neck masses. Lymph node was the most common site of FNAC among head and neck masses. They comprised of 239 (91.22%) cases of all head and neck masses. The most common cytological pattern observed was presence of caseousnecrosis and epithelioid cell granuloma (CN+ECG) in 50 (78.12%) cases of tubercular lymphadenitis. Reactive lymphadenitis, acute suppurative lymphadenitis and chronic granulomatous lymphadenitis comprised of 54 (22.59%), 16 (6.69%) and 14 (05.85%) cases of all lymph node masses respectively. We conclude that fine needle aspiration cytology is a highly effective diagnostic procedure in the pre operative evaluation and management of non thyroidal head and neck masses.

INTRODUCTION

FNAC is a simple, rapid, inexpensive, cost effective, safe procedure and can be used as a routine OPD procedure for the diagnosis of various lesions.

The proximity of tissues of various types and the wide range of primary and metastatic neoplasms are responsible for head and neck region being among the most interesting and challenging in FNAC diagnosis. FNAC being a minimally invasive technique is particularly suitable in this region where an incision biopsy can cause problems. Incision biopsy in this site may leave undesirable scars and can be difficult especially after radiotherapy[1].

Head and neck masses have diversity of presentation, thus the clinical judgment alone cannot always be relied upon to identify the exact cause in every case. FNAC helps to increase the likelihood of an accurate preoperative diagnosis thereby reducing the number of cases requiring excision biopsy. Aspiration cytology has the advantage of relatively less morbidity, quick to perform, no need for anesthesia, less cost and almost without any contraindications.

Head and neck masses chiefly constitute the swellings arising in lymph nodes, salivary glands, thyroid gland, tumors of supporting tissue, skin, soft tissues and bones. Various lymph node lesions that can be identified by FNAC include benign conditions such as reactive lymphoid hyperplasia, acute suppurative lymphadenitis, chronic non specific lymphadenitis, granulomatous lymphadenitis and neoplastic lymphadenopathy such as lymphomas (Hodgkin and non Hodgkin lymphoma) and metastatic neoplasms.

The various salivary gland lesions identified by FNAC can be divided into non neoplastic and neoplastic lesions. The non-neoplastic lesions include acute sialadenitis, chronic sialadenitis, retention cyst, granulomatous sialadenitis and non specific reactive changes. The neoplastic lesions include benign lesions such as pleomorphic adenoma, oncocytic adenoma, myoepithelioma and monomorphic adenoma and malignant lesions such as mucoepidermoid carcinoma, acinic cell carcinoma and adenoid cystic carcinoma[2].

Miscellaneous lesions include cysts such as thyroglossal duct cyst, branchial cleft cyst, epidermal inclusion cyst and tumors such as carotid body tumor, nasopharyngeal carcinoma and benign and malignant soft tissue tumors.

Thus the ease of fine needle aspiration coupled with the rapidity of obtaining a pathologic diagnosis allows a more intelligent therapeutic approach in head and neck region.

MATERIALS AND METHODS

This prospective study of FNAC was conducted on 262 patients over a period of 1.5 years i.e. from Jan 2022-July 2023. The patients of any age and either sex presenting with non thyroidal neck masses were included in the study. All patients were asked about history related to neck swelling, relevant questions to the etiological cause, present, past and family history of tuberculosis and other relevant histories. General physical examination and systemic examination was carried out in all patients. Certain investigations such as CBC, indirect laryngoscopy, USG, CT scan and MRI scan were carried out in selected patients. The procedure of FNAC was first explained to the patient and a written informed consent was taken. The aspiration was done in the central clinical laboratory of pathology department.

FNAC Procedure: The patient was positioned to allow the most optimal digital palpation of the mass. Taking aseptic measures, the mass was fixed with the left hand. A 5cc or 10cc plastic disposable syringe with an attached 22-26 gauge needle was placed inside the mass. Several short rapid strokes were made in different directions with needle tip within the mass. After completion of aspiration, the needle was withdrawn and hemostasis was achieved with a gauze pad. The material from the needle was expelled on to a clean glass slide and the aspirate was smeared with the help of another slide. In this way, two to four smears were prepared. Air dried and alcohol fixed smears were made. Air dried smears were stained with May-Grunwald-Giemsa while alcohol fixed smears were stained with hematoxylin and eosin stain and Papanicolaou stain. Special stains used were Zeihl-Neelsen (ZN) stain for acid fast bacilli and periodic acid-Schiff stain (PAS) for fungi.

The Zeihl-Neelsen stain for acid fast bacilli was done where the clinical suspicion or diagnosis was tuberculosis or in those cases where cheesy material was aspirated. The stained slides were examined under the light microscope and reported. A 2x2 table was used to determine sensitivity, specificity, diagnostic accuracy and positive and negative predictive values.

The Following Material was used in Performing the FNAC:

- **Needles:**
- Sterile disposable needles, 22 to 26 gauge, 1.5 inches long were used. The needles were sharp and beveled.
- **Syringes:**
- 5 cc or 10 cc plastic disposable syringes were used.
- Slides and coverslips:
- Standard, clean, dry grease free slides (75mmx25mmx1.35mm) which are properly labeled with slide marker and standard size cover slips (40mmx22mm) were used.
- Glass marking pencil with a diamond tip was used to mark the allotted number of the FNAC.

Fixative:

- Cytofixative containing a mixture of equal amount of ether and absolute ethyl alcohol was used.

Others:

- Spirit swabs.
- Sterile gauze pads.
- Complete laboratory request form with full clinical details.

RESULT AND DISCUSSIONS

A total of 800 FNACs were performed during this period in our institution. Fine needle aspirations of head and neck masses constituted 262 of these cases thus giving an incidence of 33.75% of all FNACs.

The size of swellings ranged from 0.5-15 cm in their largest diameter with a mean size of 2.77+/-S.D. 1.74 cm.

The youngest patient in the study was 1.5 yr old and the oldest was 78 years of age. The mean age of the patients was 38.8 +/-S.D. 19.55 years. In our study males predominated. Male to female ratio was 1.84:1. The frequency of cases with head and neck masses was more in third and fourth decade together constituting 98(37.39%) cases. In males, the maximum number of cases were in the seventh decade comprising of 30 (17.64%) cases. In females, the maximum number of cases were in the third decade comprising of 29 (31.52%) cases.

The head and neck masses were grouped into the following three categories. These were 1) Lymph node swellings 2) Salivary gland swellings and 3) Miscellaneous. The miscellaneous category included swellings over maxillary region, cheek and scalp.

The lymph node masses were maximum in our study constituting 239 (91.22%) of all the cases. The salivary gland masses were 13 (04.96%). The miscellaneous category included least number of masses i.e. 10 (03.82%).

In our study out of 262 cases, benign lesions predominated with 166 (63.36%) cases while malignant lesions comprised of 79 (30.16%) cases. Fine needle aspiration was inadequate for opinion in seventeen cases constituting 6.48% of total cases. The mean size of the swelling responsible for inadequate aspiration was 1.23+/-S.D. 0.43 cm.

Small size of the swelling, hemorrhagic aspirate and scant cellularity were the common causes responsible for inadequate aspiration.

Benign lesions: There were166 benign lesions in our study consisting of inflammatory lesions, non neoplastic lesions and benign neoplasms.

In our study the most common inflammatory lesion was tubercular lymphadenitis consisting of 64 (38.56%) cases followed by reactive lymphadenitis comprising of 54 (32.54%) cases of all benign lymph node lesions. There were two cases of cryptococcal lymphadenitis. There was a single case of sialadenosis. Most common benign neoplasm was pleomorphic adenoma. It comprised of 09 (05.42%) cases. There was a single case of lipoma.

Malignant lesions: There were 79 malignant lesions diagnosed on cytology.

The most common malignant lesion was metastatic tumors in lymph nodes comprising of 68 (86.07%) cases. Malignant salivary gland lesion was not noted.

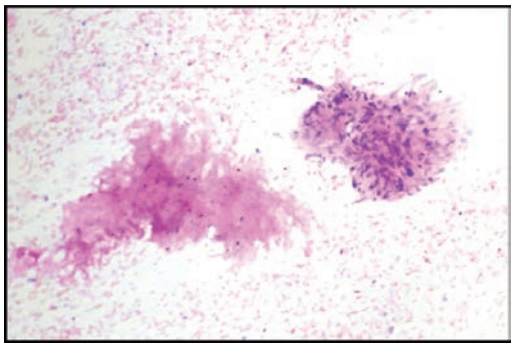

Fig. 1: Photomicrograph showing caseous necrosis and agranulomain caseating tubercular lymphadenitis. (H and E,x40).

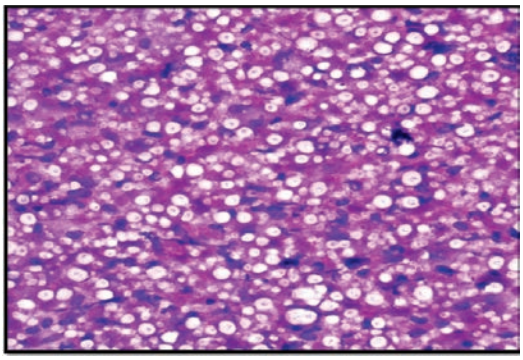

Fig. 2: Photomicrograph of a smear showing variably sized, rounded, capsulated budding yeast forms in Cryptococcal lymphadenitis. (H and E,x100).

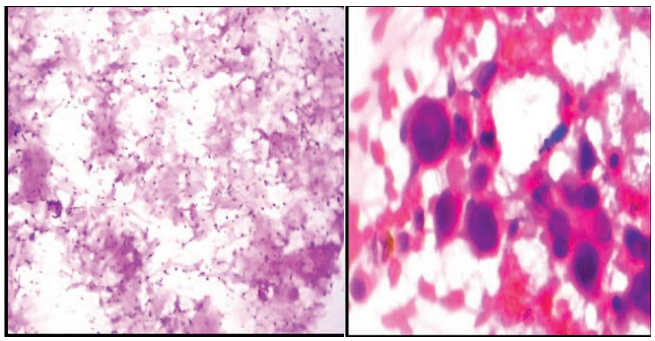

Fig. 3: Photomicrograph showing mature squamous cells with abundant keratinized cytoplasm in well differentiated squamous cell carcinoma. Nuclearatypia income cells helps in the diagnosis.(H&E,x40).

Table No. 1: Cytological category wise distribution of head and neck masses

Cytological category	No. of cases	Percentage
Benign	166	63.36
Malignant	79	30.16
Inadequate	17	06.48
Total	262	100

Table No. 2: Cytological diagnosis of benign lesions

Lesions	No. of cases	Percentage
Inflammatory Lesions		
Reactive lymphadenitis	54	32.54
Tubercular lymphadenitis	64	38.56
Chronic granulomatous lymphadenitis	14	08.44
Acute suppurative lymphadenitis	16	09.64
Cryptococcal lymphadenitis	02	01.20
Non Neoplastic Lesions		
Sialadenosis	01	00.60
Benign salivary gland lesions	03	01.80
Epidermal cyst	02	01.20
Benign Neoplasms		
Pleomorphic adenoma	09	05.42
Lipoma	01	00.60
Total	166	100.00

Table No. 3: Cytological diagnosis of malignant lesions

Lesions	No. of cases	Percentage
Metastatic tumors	68	86.07
Squamous cell carcinoma	05	06.32
Non Hodgkin lymphoma	01	01.27
Hodgkin lymphoma	02	02.53
Poorly differentiated carcinoma	01	01.27
Leukemic infiltration	01	01.27
Sarcoma	01	01.27
Total	79	100

Table No.4: Cytological patterns of tubercular lymphadenitis

Cytological pattern	No. of cases	percentage	AFB positivity (%)
Caseation necrosis only (CN)	06	09.38	100
Caseation necrosis and epithelioid cell granuloma (CN+ECG)	50	78.12	88
Epithelioid cell granuloma only (ECG)	06	09.38	100
No caseation necrosis, no epithelioid cell granuloma (NCNG)	02	03.12	100
Total	64	100	

Table No.5: Cytological distribution of metastatic tumor deposits

Lesion	No. of cases	Percentage
Squamous cell carcinoma	67	98.52
Germ cell tumor	01	01.48
Total	68	100.00

There were 5 (06.32%) cases of squamous cell carcinoma. These were noted over maxillary region (2 cases), cheek (2 cases) and scalp (1 case). There was a single case of leukemic infiltration of lymph node. There were two cases of Hodgkin lymphoma and one case of non Hodgkin lymphoma. Single case of poorly differentiated carcinoma was noted over left maxillary region. One case of sarcoma was noted over left cervical region.

Analysis of Lymph Node Lesions: Lymph node lesions accounted for 239 (91.22%) out of 262 cases of fine needle aspiration cytology in the present study.

In our study reactive lymphadenitis was most common in second and third decades together comprising of 28 (51.84%) cases.

In males, 17 (56.67%) cases occurred in first two decades whereas in females 16 (66.66%) cases occurred in second and third decades. There was slight male predominance with M: F ratio of 1.25:1.

Cytological Findings in Reactive Lymphadenitis: Smears showed presence of a mixed population of lymphoid cells representing the whole range of transformation. Numerous scattered histiocytes with intracytoplasmic nuclear debris (tingible body macrophages) were noted.

Cytological Findings in Tubercular Lymphadenitis: The criteria followed for the diagnosis of tubercular lymphadenitis were acid fast bacilli positivity irrespective of cyto-morphology and / or presence of caseous necrosis with epithelioid cell granulomas.
In majority of the cases cheesy or purulent material was aspirated.

Smears of tubercular lymphadenitis were grouped into four categories. Smears showing caseation necrosis with epithelioid cell granulomas (CN+ECG) constituted predominant pattern (Fig. 4) with 50 (78.12%) cases, followed by only caseous necrosis (CN) and only epithelioid cell granuloma (ECG) patterns

(Fig.5) with 6 (09.38%) cases each and no caseous necrosis no granuloma (NCNG) with 2 (03.12%) cases. The smears in this pattern showed presence of abundant viable and degenerated polymorphs and were positive for acid fast bacilli.

Chronic Granulomatous Lymphadenitis: Chronic granulomatous lymphadenitis was considered when granuloma was observed in the absence of acid fast bacilli in the smears studied.

Cytological Findings in Chronic Granulomatous Lymphadenitis: Smears showed presence of granulomas along with scattered histiocytes and lymphocytes (Fig 1). In some cases suppuration was also noted along with granuloma. Caseous necrosis was not seen and 20% Z-N staining for acid fast bacilli was negative.

Chronic granulomatous lymphadenitis with or without suppuration can occur in conditions such as in cat scratch disease, Hodgkin lymphoma and fungal infections. So biopsy was advised for definitive diagnosis.

Acute Suppurative Lymphadenitis:

Cytological Findings in Acute Suppurative Lymphadenitis: In majority of the cases purulent material was aspirated. Smears showed presence of abundant viable and degenerated polymorphs along with scattered lymphocytes and histiocytes. 20% Z-N staining for acid fast bacilli was negative in all of these cases.

Cryptococcal Lymphadenitis: There were two cases of cryptococcal lymphadenitis. One of them was a 28 year old female who had presented with bilateral multiple cervical swellings. HIV status in this patient was not known. Another patient was HIV positive 45 year old man. He had presented with left cervical lymph node enlargement.

Cytological Findings: Smears examined in both these cases showed cells of lymphoid series. The background showed multiple scattered encapsulated organisms of variable sizes showing budding yeast like forms (Fig 2). One of these cases also showed granulomas. Special stains such as PAS , GMNS and mucicarmine were done to demonstrate the capsule.

Metastatic Tumors in Lymph Nodes: The most common malignancy encountered in lymph nodes was metastatic tumor deposits.

In our study squamous cell carcinoma was the most common metastatic tumor in lymph nodes comprising of 67 (98.52%) cases.

Metastatic Squamous Cell Carcinoma-Cytological Findings: Well differentiated squamous cell carcinoma: In majority of cases smears showed presence of squamous cells having moderate to marked nuclear atypia (Fig.3). The background showed dyskeratotic cells, keratin debris and acute and chronic inflammatory cells. Some of the cases showed predominantly mature squamous cells with mild nuclear atypia along with dyskeratotic cells in the background but no definite tumor clusters. However in these cases clinical examination showed evidence of primary tumor.

Moderately Differentiated Squamous cell Carcinoma: In majority of the cases smears showed scattered, clusters and sheets of round to polyhedral cells having pleomorphic hyperchromatic nuclei and coarse chromatin clumping with moderate amount of cytoplasm. The background showed scattered squamous cells having nuclear atypiaand dyskeratoticcells.

Poorly Differentiated Squamous cell Carcinoma: Smears showed clusters and sheets of malignant epithelial cells with marked nuclear atypia and scanty cytoplasm The keratinization of cytoplasm was either minimal or not evident. In such smears presence of few dyskeratotic cells helped in the identification of squamous differentiation.

Malignant Lymphomas:

Hodgkin Lymphoma: There were two cases of Hodgkin lymphoma. First case was of a 23 year old female who had presented with bilateral cervical swellings. The other case was of a 10 years boy who had presented with 2x3 cm, firm, mobile right cervical swelling.

Cytological Findings in Hodgkin Lymphoma: Smears from first case showed rich cellularity with presence of scattered R-S cells and L and H cells. Smears from second case showed scattered R-S cells with presence of few granulomas and fibrous strands.

Non Hodgkin Lymphoma: Single case of non Hodgkin lymphoma was also noted. This was a 70 year old man who had presented with bilateral cervical and right submandibular swelling.

Cytological Findings in non Hodgkin lymphoma: Smears showed proliferation of large neoplastic lymphoid cells having enlarged nuclei with prominent nucleoli and irregular nuclear membrane with scanty cytoplasm.

Peripheral smear of the patient showed total and differential leucocyte count within normal range. Hemoglobin was 13 gm% and platelets were adequate.

Leukemic Infiltration: A 26 year adult male who was a known case of acute lymphoblastic leukemia presented with 3x2 cm firm to hard swelling in right cervical region.

Peripheral smear of the patient showed leucocytosis with total leucocyte count of 15,000. There was a shift to left with blasts up-75%. Few nucleated RBCs were noted. Patient was severe anemic with hemoglobin level of 5 gm% and platelet count was less than 20000/mm^3. On peripheral smear blasts morphology was suggestive of lymphoid lineage and blasts were negative for MPO.

Cytological Findings in Leukemic Infiltration: Smears showed presence of large round cells with vesicular nuclei and prominent nucleoli and moderate amount of cytoplasm. The findings were consistent with leukemic infiltration of lymph node

The present study comprises fine needle aspiration cytology of palpable masses in the head and neck region excluding thyroid lesions. This cytological study helped us to categorize whether a particular lesion is benign or malignant. A specific diagnosis could be provided in some cases.

The age range in our study was from 1.5 yrs-78 years with mean age of 38.8 years. The mean age is comparable with observation made by Amatya[3] but it differs from that of McLean[4] and Wahid *et al* probably due to variation in age composition of study subjects. Our study included 170 males and 92 females with M: F ratio being 1.8:1. The occurrence of head and neck lesions was more common in males as observed in studies by McLean[4], Chauhan[5] and Ishar[6].

In the present study, lymph node lesions were most common. Similar observation was

In our study, the most common benign lymph node lesion was tubercular lymphadenitis. It comprised of 26.66% of all benign lymph node lesions. Similar observation was also made by other workers except Patra[7].

According to Gomes[8,30] a sample is called suggestive of tuberculosis when there is granulomatous inflammation, diagnostic of tuberculosis when Z-N stain and / or culture is positive and inconclusive when there is nonspecific inflammation or isolated giant cells.

In our study tubercular lymphadenitis was the most common inflammatory lesion causing cervical lymphadenopathy. This finding is in accordance with the observation noted by Khan[9].

In our study most common cytological pattern of tuberculosis observed was presence of caseous necrosis and epithelioid cell granuloma (CN+ECG) which was observed in 78.12% of cases. This finding is consistent with work done by other workers such as Shenoy[10], Vanishri[11].

Cytological pattern of no caseation no granuloma with AFB positivity was observed in 03.12% of patients. In these cases smears showed presence of suppurative pattern with many viable and degenerated polymorphs. Caseation and granulomas were absent.

Chronic Granulomatous Lymphadenitis: Chronic granulomatous lymphadenitis was considered when granuloma was observed in absence of AFB positivity in the smears studied.

There were 14 cases of chronic granulomatous lymphadenitis. Sometimes the needle may not hit foci of caseation resulting in absence of caseous necrosis on FNAC smears. The smears are then reported as chronic granulomatous lymphadenitis. In such cases multiple passes from different sites may be helpful in revealing the true nature of the lesion. Similar problem was also noted by Patra[7].

Reactive Lymphadenitis: In our study, reactive lymphadenitis was observed in 22.08% of lymph node lesions and is the second most common inflammatory cause of cervical lymphadenopathy. This finding is comparable with other workers such as Khan et al9 where it comprised of 28% of all lymph node lesions.

Acute Suppurative lymphadenitis: There were 16 (6.66%) cases of acute suppurative lymphadenitis in our study which is comparable with Patra[7] and Fatima[12] where it formed 5.3% and 4.2% of lymph node lesions.

Suppurative lymphadenitis can also be seen in HIV infected individuals. Z-N staining and cultural studies should be done in clinically suspected HIV infected cases to improve the diagnostic accuracy.

In our study metastatic tumor deposit accounted for 28.87% of all cases of lymphadenopathy in head and neck region and was the most common cause of malignant lymph node lesions in this region. Similar finding was also noted by other workers such as Patra *et al,* Bandopadhyay *et al,* Shakya *et al* and Wahid et al where metastatic lymphadenopathy accounted for 14.5%, 24%, 2.8% and 19% respectively.

Two cases of Hodgkin lymphoma were diagnosed on cytology. Kline *et al* diagnosed 20 out of 29 cases of Hodgkin lymphoma on cytology giving a diagnostic accuracy of 69%. Friedman[13] correctly diagnosed 161 out of 182 cases of Hodgkin disease with diagnostic accuracy of 88.4%. Diagnostic accuracy mentioned by Narang[14] was 88.8% on cytology.

The present study comprised of 69 cases of metastatic deposits in lymph nodes. 68 of these cases were diagnosed as metastatic squamous cell carcinoma accounting for 98.5% of all metastatic deposits. Thus SCC is the most common cytological type leading to metastasis. This finding correlates well with studies

done by other workers such as Advani[15] Wilkinson[16] where SCC is the most common tumor causing metastasis in head and neck region. One case was diagnosed as metastatic germ cell tumor in left supra clavicular lymph node in a patient with known testicular tumor. carcinoma in lymph nodes: In our study majority of the smears of metastatic tumor deposit showed presence of native lymphoid tissue in the background. However in some cases lymphoid tissue was minimal or even absent. In such cases identification of the hard, discrete mass as enlarged lymph node and evidence of the primary tumor on examination of oral cavity helped in the diagnosis of the tumor as metastatic tumor deposit.

One case of benign salivary gland lesion and other case of benign cystic lesion were observed on cytology. In case of cystic lesion, smears showed presence of macrophages against the background of proteinaceous material. This may be due to the sampling error where the needle might have hit only the cystic area. Similar problem was also encountered by Kumar[17].

CONCLUSION

Fine needle aspiration cytology offers a simple method for diagnosis of neoplastic and non neoplastic lesions of head and neck region. FNAC is a safe, quick and minimally invasive technique which can be performed as an outpatient department procedure which is readily acceptable by the patient. There is no need of anesthesia and results are obtained within short time. An accurate diagnosis can be made even in most remote areas, where other sophisticated diagnostic tools are not available.

In our study, the procedure was safe and complications were not reported. Lymph node lesions were most common. The most common non neoplastic lesion in lymph nodes was tubercular lymphadenitis and most common neoplastic lesion was metastatic tumor deposit. Squamous cell carcinoma was the most common lesion causing metastasis to lymph nodes. Pleomorphic adenoma was the most common salivary gland neoplasm observed.

The present study has made it clear that fine needle aspiration cytology is the best investigation one can ask for with a fairly good accuracy.

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