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ORIGINAL ARTICLE

Current usefulness of aspiration cytology (FNAC) in the head and neck diagnosis

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Key words

Cytology • FNAC and histology • Diagnostic oncology

Summary

Background. Fine Needle Aspiration Cytology (FNAC) is a well established and widely used method for both a preliminary and sometime final non-invasive pathologic diagnosis. FNAC is a simple and inexpensive diagnostic tool and should represent the standard of care in developing and resource-poor countries while maintaining its diagnostic usefulness in developed and advanced ones.
Methods. The concordance between preoperative FNAC and final histology was evaluated in 168 patients operated on at the Otorhinolaryngology Unit, "A. Murri" Hospital, Fermo (Italy), from January 2012 to October 2016, including thyroid cases, salivary glands and cervical masses.
Results. The percentages of correct diagnosis provided by FNAC were good in all groups of pathologies and in accordance with the mean data of the literature. In particular the kappa statistic for the degree of agreement between FNAC and definitive histology (good > 0.6 and excellent > 0.8) was 0.74 for the thyroid, 0.83 for the parotid and 0.71 for both the submandibular and the cervical masses.
Discussion. Thy 3 group is still the most challenging for a successful FNAC diagnostic prediction. Especially in the developed and advanced countries, both the immediate review of the smear with its repetition, if needed, and the aspiration performed under CT/MRI guidance, when necessary, seem to further empower FNAC diagnostic resolution and should be pursued. Being routinely used for more than 40 years, FNAC is still a valuable and cost-effective tool to distinguish between cases that don't need any treatment, cases to be treated medically and those that require surgical excision. In the Authors' opinion every institution should periodically review its data in order to monitor and assess the accuracy of its diagnostic activity.

Introduction

Fine Needle Aspiration Cytology (FNAC), introduced ninety years ago [1], has been routinely used for the last 40 years as the gold standard in the diagnosis of head and neck masses. All along several reports have highlighted the diagnostic power, reliability, tolerability and cost effectiveness of this exam [2-4].
The samples may be obtained directly by the specialist involved or by the cytopathologist, freehand under palpation or with an ultrasonographic guide [5].
Besides depending on the skill of the ultrasonographer, the ability of the pathologist to take the sample in the most representative area of the target organ and the good interplay between the two operators, FNAC is mainly conditioned by the experience of the cytologist. For this reason every institution should regularly assess the reliability of its cytology service and try to improve it if it is poor.

In November 2011 our institution enrolled a well referenced cytopathologist (PMG) and since then we had a close and fruitful cooperation. Before that time our cytological facility was suboptimal and we accepted external reports, whereas nowadays we prefer that patients undergoing surgery are examined by our own cytology facility. After five years of such activity we decided to analyse the collected data in order to monitor the epidemiology of the diseases and to confirm the impression of a steadily increasing quality of our FNAC.

Methods

From January 2012 to October 2016, 206 consecutive patients were operated on at the Otorhinolaryngology Unit, "A. Murri" Hospital, Fermo (Italy) (Tab. I).
Nearly all the parotid patients and the vast majority of

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Tab. I. Composition of the series (January 2012-December 2016).

	Number of patients			Previous citology available			Citology done by us			Citology done elsewhere		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Thyroid	108	32	76	88	24	64	75	21	54	13	3	10
Salivary glands	64	38	26									
Parotid	51	32	19	46	32	14	41	28	13	5	4	1
Submandibular	13	6	7	8	3	5	8	4	4	0	0	0
Cervical masses	34	12	22	26	11	15	24	11	13	2	0	2
Total cases	206	82	124	168	70	98	148	64	84	20	7	13

the thyroid patients had a previous FNAC performed under ultrasonographic control. Few thyroid patients were operated on without previous cytology, due to a clear history of thyroid dysfunction or chronic enlargement without any sign of malignancy.
For other head and neck masses (cervical masses) the request of a FNAC in the pre-operative work-up relied on the clinical history and the diagnostic question of the referring specialist (haematologist, infectious disease specialist, etc.).

The cases available for our review were 168.
In most of the cases the patients were referred to us by our endocrinologists and had already a cytologic report. When necessary we repeated the exam, mainly when there was a doubtful diagnosis.
Our cytologist collects himself the samples in the radiology outpatient office working together with the ultrasonographer. Aspiration is performed through a 22 gauge needle connected to a 20 cc syringe mounted on a Cameco-like handle. The material is smeared on glass, fixed

Tab. II. Concordance FNA–HISTOLOGY: **Thyroid**.

Class	Series	FNAC		Histopathology		Statistics	
		Benign	Malignant	Benign	Malignant	False negative	False positive
Thy 2							
	Our data	23	0	21	2	8,7%	
	23 (m. 6 - f. 17)						
	Done elsewhere	6	0	6	0		
	6 (m. 1 - f. 5)						
Thy 3*							
	Our data	28	0	23	5	17,9%	
	28 (m. 9 - f. 19)						
	Done elsewhere	5	0	3	2	40,0%	
	5 (m. 1 – f. 4)						
Thy 4							
	Our data	0	7	2	5		28,6%
	7 (m. 2 - f. 5)						
	Done elsewhere	0	1	0	1		
	1 (m. 1 - f. 0)						
Thy 5							
	Our data	0	17	0	17		
	17 (m. 4 - f. 13)						
	Done elsewhere	0	1	1	0		100,0%
	1 (m. 0 - f. 1)						

*Thy 3 and oxiphilic component "o"	Benign	Malignant	%
without "o" (18 pts)	15	3	16.6 %
with "o" (10 pts)	8	2	20.0 %
*Thy 3a and Thy 3b			
Thy 3a (9 pts)	8	1	11.1 %
Thy 3b (19 pts)	15	4	21.0 %

in ethanol and stained with Papanicolaou solution. The slides are then examined on a different day.

In this study we compared the diagnostic response given by the FNAC to the final pathologic diagnosis, pointing out the percentage of agreement and analysing what went wrong with the cytologic analysis (Tabs. II-III-IV).

The cytologic diagnosis was done according to the C1-C5 reporting scheme, which is validated only for breast but it is routinely used for several other organs [6]: non-diagnostic (C1), benign (C2), indeterminate (C3), suspicious (C4), and malignant (C5).

As regards the thyroid group we used the Thy (1 to 5) nomenclature.

The statistical analysis was carried out only on the cases where the cytology was performed and read by our cytologist. Eventually 148 cases were then compared (Tab. V).

Statistical study included sensitivity, specificity, positive and negative predictive values (PPV, NPV), likelihood ratio for positive and negative test results (a good test has LR + > 10 and LR- < 0.1), the area under the ROC curve (AUC > 0.7 good; > 0.8. very good; > 0.9 excellent), Youden's index (Y = 0, poor; Y = 1, perfect) and diagnostic odds ratio (DOR: values from 0 to infinity. DOR < 0.05, high negative association; DOR = 1, no association; DOR > 20, high positive association), according to STARD statement [7].

We also calculated the overall accuracy (OA) and kappa statistic for the degree of agreement between FNAC and

Tab. III. Concordance FNA-Histology: **Salivary glands.**

PAROTID			
FNAC	**HISTOPATHOLOGY**		
Benign	**Correct**	**Other benign**	**Malignant (false negative)**
Pleomorphic Adenoma (Pl.A)			
Our data: 19 (9 m-10 f)	19		
Done elsewhere: 3 (2 m-1 f)	3		
Adenolymphoma (Alph) (Warthin's)			
Our data: 12 (11 m-1 f)	9	3	
Done elsewhere: 1 m	1		
Oxyphilic Adenoma			
Our data: 1 m	1		
Done elsewhere: 1 m	1		
? inflam/Adenolymph			
Our data: 1 f	1 (inflam)		
Malignant	Correct	Other malign	Benign (false positive)
Our data: 8 (7 m-1 f)	5	1	2
SUBMANDIBULAR			
FNAC	**HISTOPATHOLOGY**		
Benign	**Correct**	**Other benign**	**Malignant (false negative)**
Pleomorphic Adenoma (Pl.A)			
Our data: 2 f	2		
Adenolymphoma (Warthin's)			
Our data: 1 m		1	
? Inflammation			
Our data: 2 (1 m-1 f)	2		
? Adenolimph/nH-lymph			
Our data: 1 m			1 (nH-L)

Tab. IV. Concordance FNA-Pathology: **Cervical masses.**

FNAC	**HISTOPATHOLOGY**		
BENIGN	**Correct**	**Other benign**	**Malignant (false negative)**
Our data: 9 (4 m-5 f)	6		3
MALIGNANT	Correct	Other malign	Benign (false positive)
? malignant			
Our data: 3 (1 m-2 f)	3		
Done elsewhere: 2 f	2		
Malignant			
Our data: 12 (6 m-6 f)	12		

Tab. V. Statistical analysis (only our data).

Agreement between FNAC and histology					
	Cases	Yes	No	False negative	False positive
Thy 2	23	21	2	2	0
Thy 3	28	23	5	5	0
Thy 4	7	5	2	0	2
Thy 5	17	17	0	0	0
Salivary glands: parotid	41	39	2	0	2
submandibular	8	7	1	1	0
Cervical masses	24	21	3	3	0
TOTAL	148	133 (89.8%)	15 (10.2%)	11	4

	Overall statistics	Thyroid	Salivary glands		Cervical masses
			Parotid	Submandibular	
Sensitivity	80.36%	75.86%	100%	66.67%	83.33%
Specificity	95.65%	95.65%	94.29%	100%	100%
PPV (positive predictive value)	91.84%	91.67%	75.00%	100%	100%
NPV (negative predictive value)	88.89%	86.27%	100%	83.33%	66.67%
LR+ (likelihood ratio for positive test results)	18.48	17.45	17.50	∞	∞
LR- (likelihood ratio for negative tests results)	0.21	0.25	0.00	0.33	0.17
AUC (area under the ROC curve)	0.88	0.86	0.50	0.83	0.92
Youden's index	0.76	0.72	0.94	0.67	0.83
Overall accuracy	89.86%	88.00%	95.12%	87.50%	87.50%
DOR (diagnostic odds ratio)	90.00	69.14	∞	∞	∞
kappa statistic	0.78	0.74	0.83	0.71	0.71

conclusive histology (> 0.4 moderate, > 0.6 good, > 0.8 excellent), as reported in the literature [8].

Results

Thyroid (Tab. II)

In the 29 patients where the FNAC diagnosis was **Thy 2**, the basic report of benignity (colloid plus hypertrophic thyrocytes) was histologically confirmed in 20/21 cases. In one case (female) foci of papillary carcinoma (PK) ≥ 1 cm were detected by histology. In this patient FNAC was performed on another nodule where the diagnosis of Thy 2 was indeed correct.

Specific FNAC diagnosis of goiter (G) was confirmed in 4/4 cases, in one of which final histology also detected a chronic thyroiditis (cT), while in another one a follicular adenoma (FA) was also present.

One case with oxyphilic component at FNAC resulted in a FA + G + cT.

FNAC suggestion of FA was histologically confirmed in 2/3 patients (one done by us, the other done elsewhere). In the third case (FNAC done elsewhere) the histologic result was G + cT. In a patient (male) with a FNAC diagnosis of FA done by our cytologist, the histology showed a PK in another nodule (1.4 cm) which hadn't been aspirated.

Thus, a missed diagnosis of malignity at FNAC (false negative) occurred in 2/23 our cases (8.5%), where the malignant nodule had not been aspirate. The cytology done elsewhere was correct in all the 6 cases.

In **Thy 3** group we consider the so-called follicular lesion of undetermined significance (FLUS).

Among the 28 patients who had the cytology performed at our facility the definitive histology showed five malignancies (false negative: 17.8%).

In one female a FA plus a papillary cancer, follicular variant (PKF), was detected.

Another female turned out to be affected by a FA plus a PK. Again, cancer was detected in a not FNAC-sampled nodule.

Two further cases (females) with a FNAC diagnosis of no more specified FLUS turned out to be G with a microfocus (0.3 and 0.35 cm, respectively) of PK. The fifth case, a young man with FLUS at the cytology, had a final histology of minimally angioinvasive Follicular Carcinoma (FK).

We operated on five patients with the cytology done elsewhere. Two of these had a malignancy histologically detected (false negative: 40%). A female with a FNAC diagnosis of FLUS query FA, turned out to be affected by FK with involvement of the thyroid parenchyma and venous invasion. Another young female with FNAC diagnosis of FA had a histological diagnosis of FA with nuclear aspects of PK.

In **Thy 4** group, for three patients (all males) with query malignant FNAC, the diagnosis was histologically confirmed: one PK in FA and two medullary carcinomas (MK).

In the four cases (all females) where a PKF was suspected at FNAC, definitive histology was benign in two cases. In the third a 0.5 cm PK in FA was spotted at

final histology. The fourth patient had a confirmed PK. The malignancy was overestimated in 2/6 cases (false positive: 33%). No false negative was present.
In **Thy 5** group. 100/100 of malignancies were detected and the histotype was also correct. No false negative was present. We had a false positive in the sole patient (female) with the FNAC performed elsewhere.

Salivary Glands (Tab. III)

Parotid

In our series we observed 19 pleomorphic adenomas (Pl.A) and the FNAC diagnosis was correct in every case. The same happened for the three patients with the cytology done elsewhere.
As regards Warthin's Tumour (Alph), FNAC was correct in 9/12 patients. In 3/12 cases the definitive histology showed a different diagnosis of benignity (two Pl.A and one Oxyphilic Adenoma (oA)), still correct for the statistical analysis. In the patient with the FNAC done elsewhere the cytologyc diagnosis of Alph was confirmed by histology.
Two oxyphilic (Hurtle's cell) adenomas (oA) diagnosed at FNAC (one done by us, another done elsewhere) were confirmed by histology.
One patient whose FNAC was in doubt between inflammation and Alph turned out to be simple inflammation.
Six out of 8 malignancies suspected by FNAC were confirmed at definitive histology. Two false positives (25%) were detected: one query malignant cytology resulted in inflammation, whereas one FNAC suspected for adenocystic carcinoma (Adenocystic C) turned out to be a basal cell adenoma (BCA).
No lymphoma was observed.

Submandibular

In the 8 patients of this group FNAC reports matched the following histology in all but two cases. One (female) diagnosed by FNAC as Alph turned out to be an inflammation; another (male) with FNAC uncertain between Alph and non-Hodgkin lymphoma (nH-L) was detected as nH-L by definitive histology.
For the statistical analysis (Tab. V) only this second case is relevant and was considered as a false negative (12.5%).

Cervical Masses (Tab. IV)

In this group there was correspondence between FNAC and histology in 21/24 of our patients (87,5%) and in the two patients with the cytology done elsewhere.
2/24 of our cases had a wrong FNAC diagnosis of benignity, C2.
A 56 year-old male with clinical, indolent, left neck adenopathy, FNAC diagnosed as inflammation, at definitive histology (after several slide reviews and consultations) turned out to be a centrofollicular, nodular and diffuse, "floral" variant of grade 2 B lymphoma.
A 41 year-old female, with a 1.5 cm right supraclavicular mass, had a FNAC diagnosis compatible with lymphadenitis, but she was operated for breast cancer five years before. Due to this clinical history we proceeded directly to surgery and the histology showed a fibrofatty tissue with big nervous structures infiltrated by epithelial cancer cells, predominantly organized in solid nodules and occasionally in glandular structures. No lymphatic structures were recognizable. Consistent with metastasis from breast cancer.
One (female) of the two patients with dubious/query malignant FNAC (C3: query lymphoadenitis/granuloma/lymphoma), resulted as nH-L at the histologic examination and we accounted it as another false negative, while the other patient (male) with a possible mesenchymal disease vs. pleomorphic adenoma was Pl.A at histology.
In two of our cases and in one with FNAC done elsewhere we had a diagnosis of "necrosis". All three had a final histology of malignancy. Due to our attitude in such cases to both repeat the FNAC and go on to surgery we considered them as correct (Tab. III).

Discussion

The majority of papers reports a statistical appraisal of the overall cases. Following this criterion, our series sensitivity is 80.36%, specificity 95.65%, overall accuracy 89.86%, PPV 91.84% and NPV 88.89% (Tab. V).
These figures are substantially in agreement with the ones reported by Tandon and Co. [9] and Suryawanshi e Co. [10]. In this latter Authors' series, as in nearly all the series of the far east, FNAC is mostly adopted for lymph node lesions, while in western countries the thyroid cytoaspiration is generally the most frequent indication.
From our experience it is more useful and meaningful to study the diagnostic power of FNAC for the different categories of sampling.

Thyroid

In the **Thy 2** group FNAC diagnosis did not match the final histology in 2/23 cases.
Remarkably, in both cases the malignant cells were located in a nodule which had not been sampled.
This drawback reinforces the discussion about how many nodules have to be sampled. In fact, besides mastering a meticulous sampling technique, a multiple node aspiration and an immediate analysis of the smear would be advisable too and an improved resolution of the US imaging should be pursued.
Thy 3 group represents 37% of all our thyroid FNAC cases and is the class that sets the most challenging decisional tasks.
In our series we registered 5 false negative cases, that is a 17.8% risk of missing a patient with malignant disease if we choose not to operate on. This is a better percentage than the 28,2% reported by Lakhani and coworkers. and slighty less than the range between 20% and 50% of the literature [11]. Based on these results we might probably suggest our endocrinologists to reduce their indications to surgery in Thy 3 cases, as the trustability of our cytologist seems to be good.

Fig. 1. Oxiphilic component (Papanicolaou stain, 40 X).

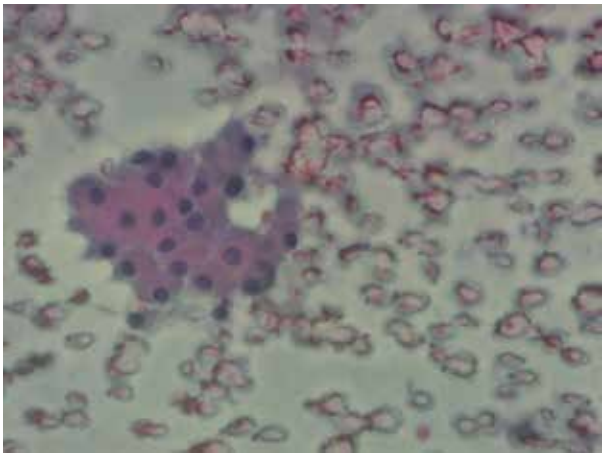


Fig. 2. Typical Thy 3a cytologic sample (Papanicolaou stain, 20 X).

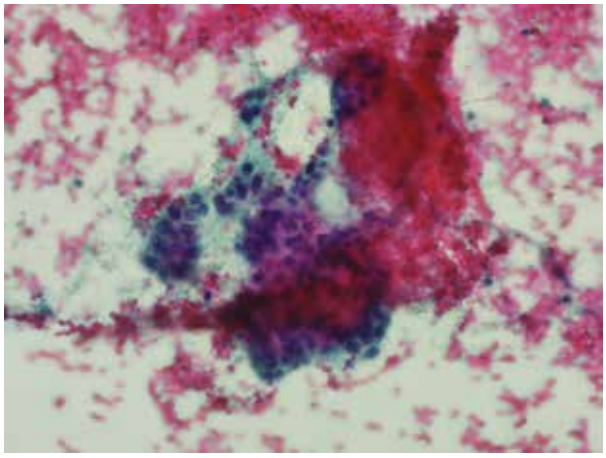


Fig. 3. Thy 3b cytologic sample with microfollicular arrangement (Papanicolaou stain, 20 X).

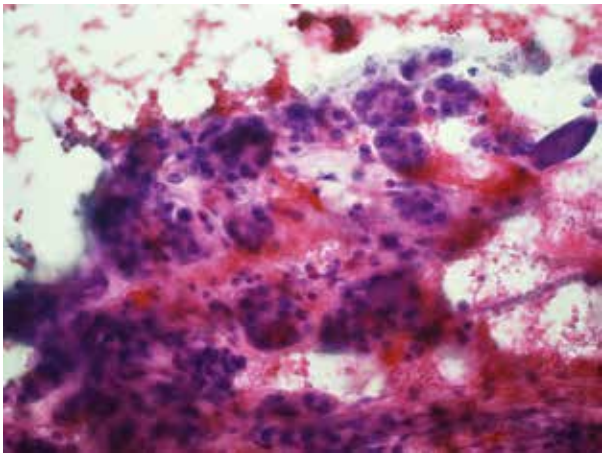
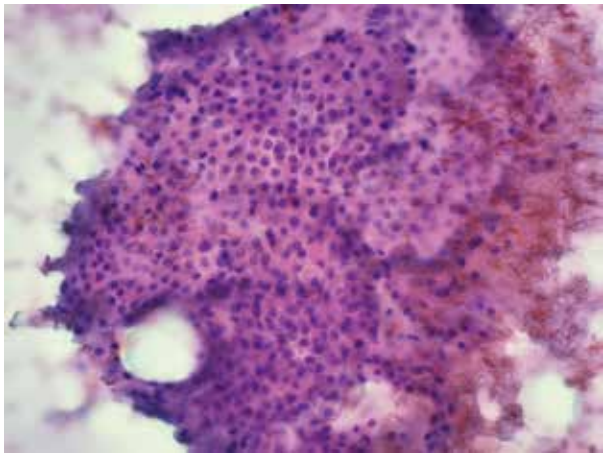


Fig. 4. Thy 3b cytologic sample with oxiphilic (Hurtle's cell) predominance (Papanicolaou stain, 20 X).



In order to improve the therapeutic decision we used to subdivide the cases as without and with oxyphilic component (**o**), (Fig. 1), based on the opinion that the presence of oxiphilic cells might increase the risk of malignancy at the final histology.

According to this criterion of grouping, (Tab. II) Thy 3 without **o** (18 patients) showed 3/15 malignancies (false negative: 16.6%) while in Thy 3 with **o** subgroup (10 patients) the false negative were two (20%).

Unfortunately the numerosity is not enough for getting a reliable statistical feed-back, even if the trend doesn't seem significant.

Moreover our data point to another pitfall, besides the better detection of the nodule to be sampled or the necessity of sampling more or even all the nodules: the dimension of the malignancy.

In fact 2/5 of our patients showed malignant nodules of less than 0.5 cm and these cases might not account for a wrong diagnosis, as stated by Singh et al., 2011 [12].

Another patient had a minimal angioinvasion of the capsule of a typical FA and again his prognosis seems to be considered the same as of a simple FA.

In 2014 the 'Indeterminate for malignancy' (Tir3/Thy3 in the Italian and British systems for classification) was suggested and the Italian Thyroid Association together with the Italian Society of Pathology and Cytology adopted the sub-classification in Thy 3a and Thy 3b [13].

Thy 3a is characterized by increased cellularity with scattered microfollicular structures (< 60% of the whole cellularity) and exclusively mild cytologic atypia (Fig. 2).

Thy 3b presents high cellularity in a predominant microfollicular/trabecular arrangement (> 60% of the cell component), with focal cytologic atypia (mostly moderate, rarely severe) suggestive of a "follicular neoplasm" (FN), (see Fig. 3).

Samples composed almost exclusively of Hurtle cells ("Hurtle cell neoplasm") are included in the Thy 3b subcategory, too (Fig. 4)

We classified our Thy 3 material also in the light of these

further recommendations and the results are as follows (Tab. II).
Thy 3a cases where 9 with one malignancy (11,1%), while we had 19 Thy 3b patients with 4 malignant cases (21%).
Such results seem to confirm that subdividing the Thy 3 class in these two subgroups is helpful in selecting patients to address to surgery, even if the percentage of risk remains low. This decision should, in our opinion, be complemented by other factors like the volume of the lesion, its US characteristics, the tendency to size increasing over the time, the presence of infoldings and microcalcifications.
In **Thy 4** series 2/5 malignancies correctly diagnosed at FNAC were ≤ 0.5 cm in size while the malignancy was overestimated in 2/6 cases. No false negative was present.
In **Thy 5** group 100/100 of malignancies were detected and the histotype was correct. No false negative was present.
The statistical analysis took into consideration only the 75 patients whose FNAC was performed and read by our cytologist. We grouped the patients as follows:
• non malignant: Thy 2 and Thy 3
• malignant: Thy 4 and Thy 5
The results are showed in Tab. III.
Sensitivity is 75.86%, specificity 95.65% and overall accuracy 88%. The kappa statistic for the degree of agreement between FNAC and definitive histology is 0.74, being good > 0.6 and excellent > 0.8.
These figures are in accordance with the mean data of the literature as reported by Gharib [14].

Salivary Glands

Statistical analysis of our cases is in accordance with the data available in the literature [4 8].
While considering parotid and submandibular lesions separately, the figures appear better for the parotid.

Parotid

In our series the FNAC diagnosis of Pl.A was confirmed at definitive histology in every case, both ours and done elsewhere.
Such results agree with Atanda's report [15] but not with Singh and coworkers [16] who highlighted the difficulty in differentiating between Pl.A and Adenocystic Carcinoma (AdenocysticC), with FNAC underestimating the disease.
Naz and Co. (2015) [4] reported both underestimation (Mucoepidermoid Carcinoma and AdenocysticC diagnosed at FNAC as Pl.A) and overdiagnosing (FNAC uncertain between Metastatic Squamous Cell Carcinoma and Mucoepidermoid Carcinoma and histology consistent with Pl.A).
As far as Alph and oA no overestimation has been reported.
Six out of eight malignancies suspected by FNAC were confirmed at definitive histology. Two false positives were detected: one possibly malignant turned out to be inflammation, another suspected AdenocysticC resulted in a Basal Cell Adenoma (BCA).
Misdiagnosis between AdenocysticC and BCA may happen because the former is a close differential of BCA and Pl.A [17].
In our experience this overestimation was worrisome for the patient but safe for his prognosis.
No lymphoma was observed.
Sensitivity is 100%, specificity 94.29% and overall accuracy 95.12%, with all the other parameters between good to excellent.

Submandibular

For the sole false positive no substantial overestimation of the pathology took place because the indication for surgery existed for both the diagnoses (AlymphnHlymph).
Despite the sensitivity is 66.67% the specificity reaches 100%, the overall accuracy is 87.50% and the kappa statistic 0.71.

Cervical Masses

As far as the two missed diagnoses of lymphoma (one FNAC diagnosed as C2-inflammation, the other FNAC classified as C3) the difficulties in differentiating between non-Hodgkin lymphoma and non-specific lymphadenitis or reactive follicular hyperplasia were already mentioned in the literature [18].
At least for the C3 case nothing changed in terms of treatment because in our hands nearly all C3 diagnoses undergo both a repetition of the FNAC or direct surgery.
The same happens for the FNAC diagnosis of necrosis. We consider such cases as malignant until proved otherwise and always go back to the patient's history and clinical examination and either repeat the aspiration or proceed directly to surgical excision.
Finally, for the case of supraclavicular metastasis of breast cancer, the story of the patient was too strong to let us trust on the FNAC report. We proceeded surgically and the correct diagnosis was achieved.
FNAC on head and neck masses is routinely done in the far east countries, where tubercular lymphadenitis is the most common pathological finding, while in our experience the case load is smaller.
We tried to contrast our data with an European study [19] and the results appear comparable and good.

Conclusions

As already mentioned the history of FNAC dates back to nearly ninety years ago, when it was firstly introduced in Europe [1] and in the United States [20].
Since then it has quickly become the gold standard in the diagnosis of palpable masses of the body.
Taking samples is, per se, an easy procedure that the specialist can perform himself, under palpation, even though in the majority of cases it is done by an ultrasonographer in cooperation with a pathologist. It has been also advised to have an immediate cytologic review, in order to increase the number of significant smears with a time saving for both the institution and the patients [21].
In recent years, due to its coupling with imaging techniques as CT and MRI, cytologic diagnosis has been extended to

non-palpable and deep masses, too [22], and even core needle biopsies can be performed where FNCA diagnostic resolution is supposed to be lower like for parotid lesions [23].

Because FNAC is a quick, easy to perform, safe, reliable and cost-effective technique, it is widely used and represents a powerful diagnostic tool, especially in the developing and resource challenging countries.

Due to its significant diagnostic capability, in most cases a FNAC result enables the physician to choose between clinical follow up and surgery, and in the latter case it helps to plan the extension of the operation and to adequately prepare the patient.

When dealing with poor-risk (aged) people, FNAC diagnosis of a non malignant disease may be a solid argument for avoiding surgery.

As we pointed out in the introduction, what is crucial is the expertise of the cytologist and this is particularly true for the parotid.

For this reason we strongly recommend that every institution periodically reviews its results, in order to compare and contrast them with a universal standard of care.

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