

Lymph node and lymphoid organs fine needle aspiration cytology: historical background

Citologia per ago sottile nei linfonodi e negli organi linfoidi: background storico

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Fine-needle aspiration biopsy (FNAB, FNA), or fine-needle cytology (FNC), is a diagnostic procedure used to investigate superficial or deep located nodules or masses in different organs [1-17].

The general principle of the technique is the collection of cell and small tissue fragments from target lesions, using thin needles (ranging between 22-27 gauge), with or without a syringe attached to the needle, to prepare smears, cell suspensions or cell blocks.

FNC can be performed on palpable nodules driving the needle by the fingers or by instrumental control such as ultrasound (US), computed tomography (CT) or other imaging procedures.

In the last years, endoscopic ultrasound (EUS) and trans-bronchial (EBUS) FNC have been introduced, widening even further the application of the technique.

Nowadays, FNC is widely used in the diagnosis of tumoral and non-tumoral pathologies, avoiding surgery and hospitalization just for diagnostic purposes.

Lymph node FNC has probably been the first application of the technique and among the latest to be accepted as an affordable diagnostic procedure, even though some scepticism or distrust still remain.

In fact, whereas the usage of needle for diagnostic and therapeutic purposes got lost in the mists of medicine [18], the first true FNC was

probably performed in 1912 on lymph nodes by dr. Hirschfeld a German haematologist, who reported the diagnosis of cutaneous lymphomas and other tumours with the use of FNC and histological process of the acquired material [19].

Subsequently, FNC was used to diagnose lymphoblastoma and, in 1916, dr. Aravandinos, used splenic FNC to diagnose leishmaniasis on Romanowsky stained smears [20]. The first systematic studies on lymph node FNC were then performed at John Hopkins Hospital in Baltimore using 21-gauge needle and Romanowsky stain on air-dried smears and by Dr. Dudgeon who probably was the first to establish scientifically the FNC technique [21, 22]. In the twenties, two researcher groups from the Memorial Hospital in New York City worked independently on FNC exploiting on a large scale different organs, being lymph nodes widely represented in their series. In fact, the historical study by Martin et Ellis dealt with 1,405 FNC, mainly performed on lymph nodes (662 cases) [23].

This study also witnesses the initial distrust toward the method; in fact Dr. James Ewing, chief of the Pathology Department of the same Hospital, disapproved the study because he believed the procedure increased the risk of spreading and prevented the participation of any pathologist of its own Department to the study, which was finally published by one sur-

geon and one technician [24]. Nonetheless some years later, his successor, dr. Stewart, published the results of a FNC study performed on a large cohort of organs and patients, including lymph nodes [25]. Other sporadic studies appeared in literature, but FNC was "officially" accepted as a diagnostic tool in the sixties, at the Karolinska Hospital in Stockholm, where a group of talented and dedicated cytopathologists started a Cytopathology Service available to the whole Institution [26-28].

These cytopathologists exploited all the fields of FNC including lymph nodes. Since then, the procedure spread all over the world and nowadays is routinely used for the diagnosis of different organs and pathologies, including lymph nodes.

Numerous distinguished cytopathologists have worked on the subject producing significant advances on lymph nodal FNC. For example, drs. L. Skoog and E. Tani from Karolinska Hospital mainly exploited the application of immunocytochemistry on cytopins prepared from FNC cell suspensions, to diagnose and classify non-Hodgkin lymphoma.

Dr. RL Katz [29] from MD Anderson Cancer

Center in Houston (USA) mainly investigated the application of flow cytometry on lymph nodal cell suspensions.

On the wake of their experiences as well as of those of other leading cytopathologists, lymph node FNC has been thoroughly investigated, highlighting advantages and inevitable limitations of the technique.

Nowadays, despite some persistent criticism and distrust [30], this method is a generally accepted procedure in the first diagnosis of lymph nodes enlargement. Finally the exponential diffusion of molecular technique has invested any field of diagnostic pathology including cytopathology. Numerous studies have demonstrated that vital cells obtained by FNC are excellent samples suitable for any molecular study opening new challenging evolutions to lymph node FNC [31-38].

Keywords: Fine needle aspiration biopsy, cytology, history.

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SUMMARY

Lymph node has probably been the first target of Fine Needle Cytology (FNC) and among the latest to be accepted as an affordable diagnostic procedure. In 1912, dr. Hirschfeld performed FNC to diagnose cutaneous lymphomas and other tumours.

Subsequently FNC was used to diagnose lymphoblastoma and splenic leishmaniasis on Romanowsky-stained smears. One of the first systematic study on lymph node FNC was then performed at John Hopkins Hospital, in Baltimore (USA) using FNC and Romanowsky stain on air-dried smears. In the twenties, two independent groups from Memorial Hospital (New York, USA), worked on FNC of a large scale of different human pathologies. One of this study reported 1,405 diagnoses of cancer and other diseases by means of FNC, mainly performed on lymph nodes (662 cases). In the sixties, at the Karolinska

Hospital (Stockholm, Sweden) a group of cytopathologists started a Cytopathology Service available to the whole Institution, which exploited all fields of FNC.

Since then, the procedure spread all over the world and nowadays it is routinely used for the diagnosis of different organs and pathologies including lymph node.

Distinguished cytopathologists have worked on lymph nodal FNC producing significant advances and highlighting advantages and inevitable limitations of the technique. Despite some persistent criticism, FNC is a generally accepted procedure in the first diagnosis of lymph nodes enlargement.

Moreover, numerous studies have demonstrated that vital cells obtained by FNC are excellent samples suitable for molecular evaluation, offering new challenging application to lymph node FNC.

RIASSUNTO

I linfonodi sono il primo target storico della citologia per ago sottile (FNC) e tra gli ultimi in cui l'FNC è stato generalmente accettato come affidabile procedura diagnostica. Nel 1912, il dr. Hirschfeld eseguì le prime FNC per diagnosticare linfomi cutanei ed altre neoplasie.

Successivamente l'FNC fu usato per diagnosticare linfoblastomi e leishmaniosi della milza utilizzando strisci colorati con colorazione di Romanowsky.

Il primo studio sistematico sul FNC linfonodale fu eseguito al John Hopkins Hospital di Baltimora, mediante FNC su strisci asciugati all'aria e colorati con Romanowsky.

Negli anni venti due gruppi indipendenti del Memorial Sloan Kettering Hospital (New York, USA), studiarono su larga scala l' FNC nella diagnosi di diverse neoplasie. Uno di questi studi fu condotto su 1,405 diagnosi effettuate mediante FNC, eseguite principalmen-

te su linfonodi. Negli anni sessanta, al Karolinska Hospital (Stoccolma, Svezia) un gruppo di citopatologi diede inizio ad un vero Servizio di citologia aspirativa disponibile per l'intera Istituzione, esplorandone tutti i campi applicativi.

Da allora la tecnica si è diffusa in tutto il mondo ed è routinariamente utilizzata nella diagnosi di malattie di diversa natura in diversi organi ed apparati, linfonodi inclusi. Esperti citopatologi hanno lavorato in questo campo determinando progressi significativi ed evidenziando vantaggi ed inevitabili limiti della metodica. Nonostante qualche critica e persistente diffidenza, l'FNC è una metodica generalmente accettata nella diagnosi delle linfadenopatie.

Numerosi studi hanno inoltre dimostrato che cellule vitali ottenute mediante FNC sono campioni ottimali per l'applicazione di tecniche molecolari, offrendo nuove stimolanti applicazioni all' FNC linfonodale.

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