

IV Thrombolysis At The Ehu Of Oran (2019-2021) Reduction Of Intra-Hospital Time (Door To Needle Time) <60 Mn

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Abstract:

Introduction: Intravenous thrombolysis (IVT) significantly improves clinical outcome in acute ischemic stroke, but the clinical benefit of this treatment rapidly declines with the passing of time. Still, the time from hospital admission to treatment, the door-to-needle time (DNT) is often delayed for avoidable reasons.

Methods: A neurovascular network has been set up with the collaboration of all the specialists involved in the management of strokes. A retrospective study including all patients with recent ischemic stroke treated with Alteplase IV (tissue plasminogen activator [RT-PA]) were enrolled in the stroke thrombolysis registry of the EHU of Oran.

Results: From January 2019 to 31 December 2021, 983 patients were hospitalized in the stroke unit of the EHU of Oran including (658) ischemic stroke, (261) hemorrhagic stroke, (37) cerebral venous thrombosis and (31%) subarachnoid hemorrhages. The average DNT was 80mn in 2019, then 60mn in 2020 and 30mn in 2021.

Conclusion: IV Thrombolysis is a proven treatment for patients with acute ischemic stroke. The benefit of intravenous Rt-PA in acute ischemic stroke is highly time dependent. A DNT reduction strategy had an impact on the prognosis of patients at the EHU ORAN.

Key words: Sector, Stroke, Thrombolysis, DNT

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I. Introduction :

Ischemic stroke is the most common type of stroke representing more than 80% of the total number of strokes and the main cause of disability in adults.

The incidence rises worldwide to 12.2 million according to the Global Burden Diseases study and it is the second leading cause of death.

IV thrombolysis is a proven effective therapy for patients with stroke.

Studies have proven that the time elapsed between arrival at the hospital and the initiation of therapy is an important factor for good clinical results of IVT.

RT-PA is the only authorized molecule that has a strong thrombolytic effect with a time window(3 and 4:30).It is most effective to use within 1.5 hours of onset of ischemia and remains beneficial for up to 4.5 hours.

The American Heart Association (AHA)/American Stroke Association (ASA) recommends that the DNT(Door to needle time) be 60 minutes.

The objective of our work is to describe our Neuro-vascular sector set up at the EHU of ORAN (IV thrombolysis, intra-hospital time (DNT) and to share our experience concerning the improvement and speed of patient care.

II. Materiel and methods :

The Neuro-vascular unit consists of 08 beds dedicated to the management of Neuro-vascular emergencies with a trained multidisciplinary team and protocols that meet the recommendations of the ESO (European Stroke Organisation).

This is a retrospective study of patients treated in the Stroke unit of the University Hospital of Oran, including 159 patients treated with RTPA during the period: From January 2019 until December 31, 2021. The parameters studied are:

Age, average NIHSS hospitalization, intra-hospital management delay (DNT) and type of stroke.

a-Approval of the standard protocol:

Written and informed consents were obtained from all patients included or their family members.

b-Performance of IV thrombolysis: The doses of RT-PA were 0.9mg/kg with a maximum dose less than or equal to 90mg. The rate of administration was 10% Rt-PA injection in one minute and the remaining 90% was administered intravenously in one hour.

There were no contraindications for thrombolytics.

NIHSS scores at admission were assessed and recorded by medical specialists.

III. Results :

From January 2019 to December 31, 2021, 983 patients were hospitalized in the EHU Stroke Unit (658) ischemic stroke and (261) hemorrhagic stroke, (37) cerebral venous thrombosis and (31) subarachnoid hemorrhage.

The average age of the patients was 65.66 years, the male sex (53.6%), the female sex (46.38%) and 159 (24%) of the patients were treated by IV thrombolysis. The average DNT was 80mn in 2019 then 60mn in 2020 and 30mn in 2021. The average DNT was > 60mn, during the covid 19 period, we reorganized the patient pathway with a specific Covid19 circuit and IV thrombolysis; knowing that covid 19 is not a contraindication, a PCR is done urgently for suspected cases and/or a chest scan before admission. The average NIHH was 11.66 during this time.

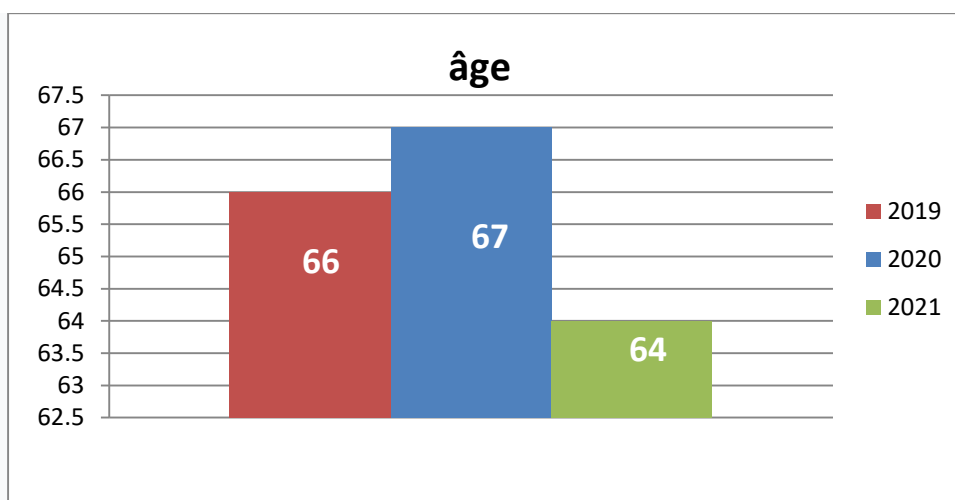


Fig 1: Distribution of thrombolysis patients according to age

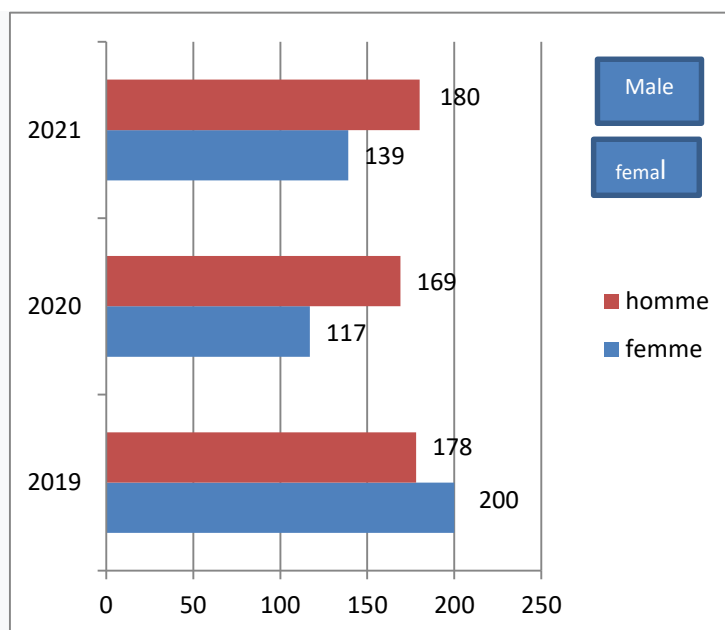


Fig 2: Distribution of thrombolysis patients according to sex

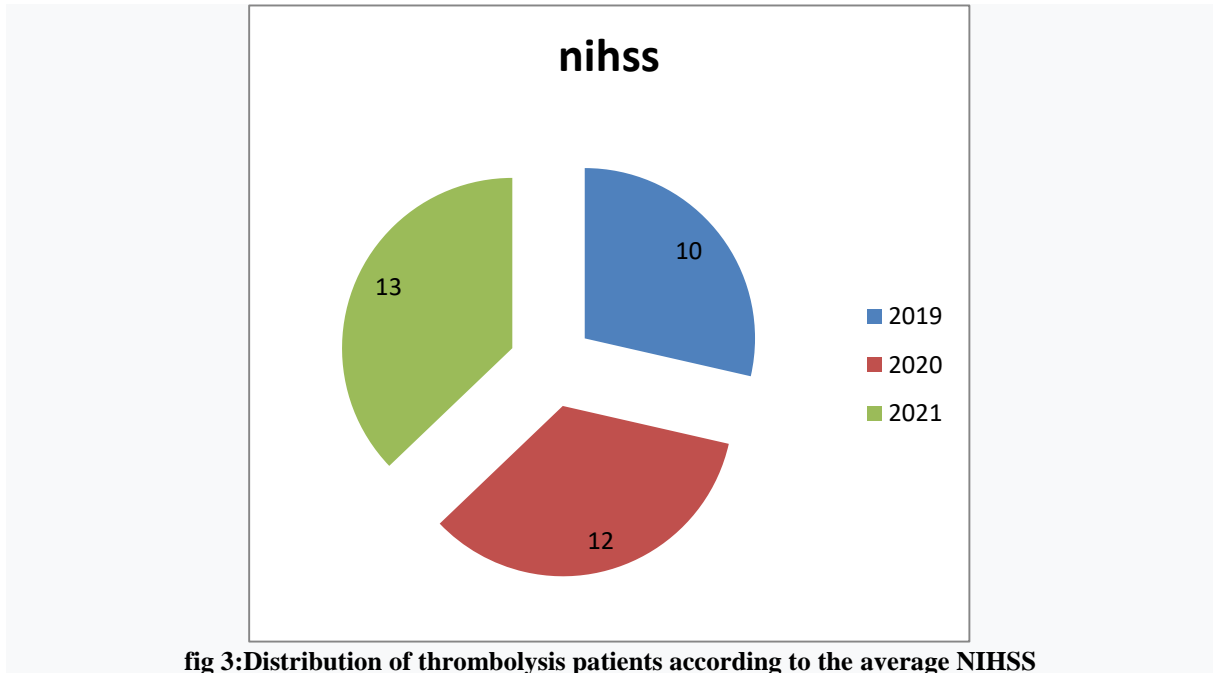


fig 3:Distribution of thrombolysis patients according to the average NIHSS

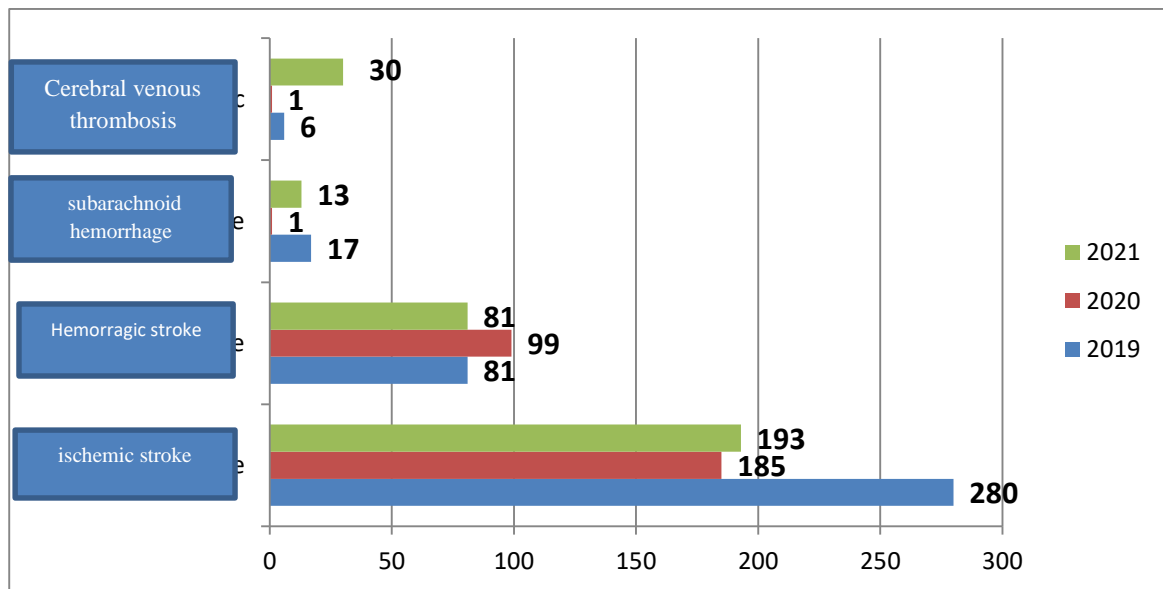


Fig 4:Distribution of patients by type of stroke

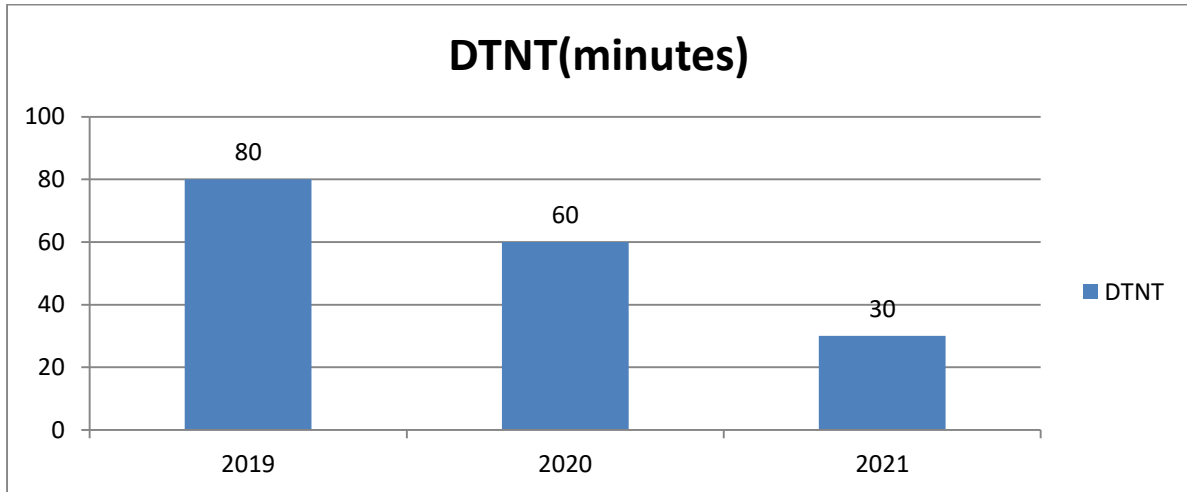


Fig5:Average DNT (2019-2021)

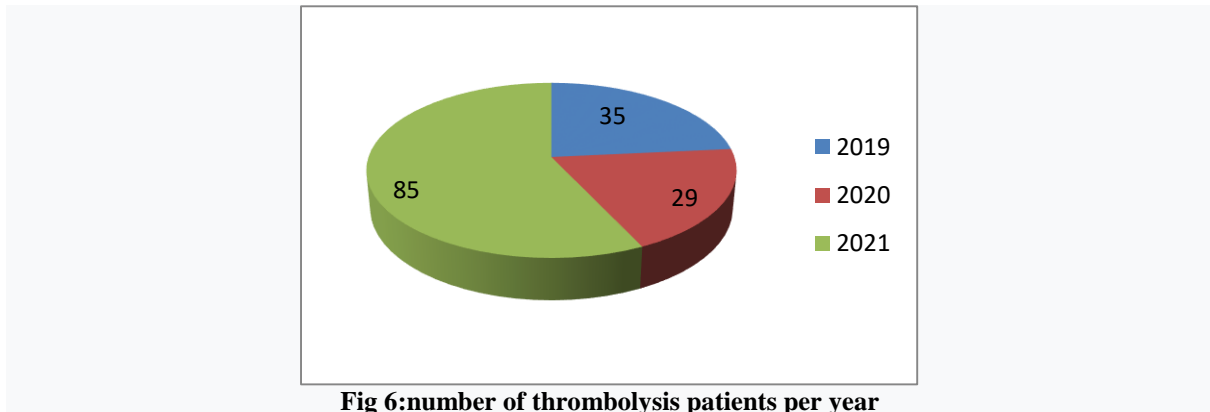


Fig 6:number of thrombolysis patients per year

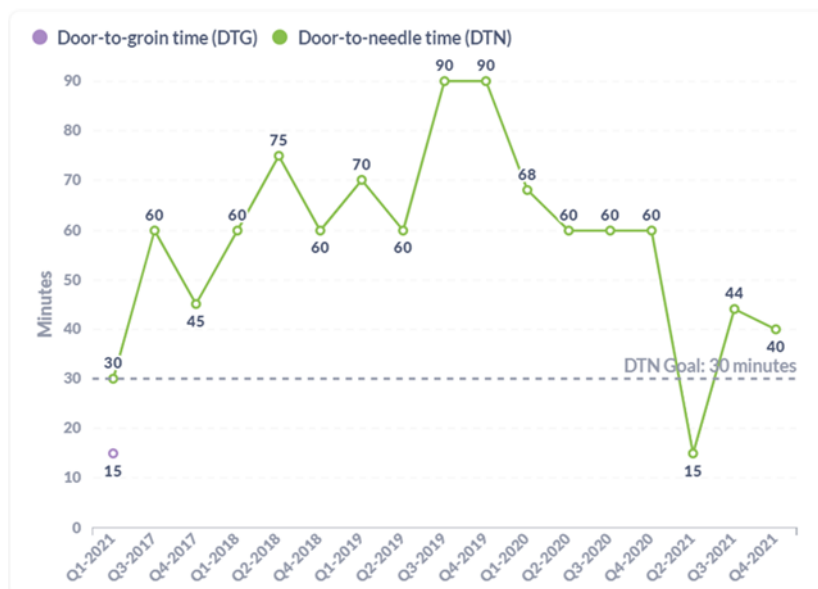


Fig 7:the DNT (2017-2021)

IV. Discussion :

Iv thrombolysis significantly improves the clinical results of patients in the acute phase in the event of ischemic stroke. The clinical benefit of this treatment decreases rapidly over time.

Definition: At first glance the definition and interpretation of DNT is unequivocal, but in clinical practice this is not the case.

An international panel of stroke specialists came together to discuss the ambiguities that may arise with current definitions and to propose a definition that leaves no room for inter-hospital differences in the documentation of DNT.

1-The door:

This is when the clock starts ticking for DNT that seems to be documented in various ways in clinical practice. For example, the SITS-MOST (Safe Implementation of Thrombolysis in Stroke-Monitoring Study) registry [09] uses “the time the patient entered the facility,” while the “American Heart Association Guidelines–Stroke uses “the time after the patient has been triaged and considered to have a stroke” [10] and other published studies use “the time of presentation to the emergency department” [11] or “the time of admission in the Stroke Unit” [12].

Considerable differences in the DNT as it can be unclear how the gate is defined. For example, in some countries, acute stroke patients are first seen in accident and emergency departments to undergo diagnostics, including CT scans. Subsequently, especially if telestroke assistance is not provided, these patients are transported to another facility for IVT.

Therefore, the most widely used definition is "the onset of DNT as the moment when the stroke patient first walks through the door of the first facility" [08]. In most hospitals, this is the entrance door to the emergency room, but as in the example above, it could also be the door to another facility. Thus, training ER staff to recognize and act on stroke symptoms and improving regional understandings will motivate neurologists or stroke specialists to improve DNT.

At the EHU, the DNT begins when the patient enters the emergency room, he will be greeted by a trained hostess who herself will notify the resident on duty in neurology who is on site in the emergency room on the same floor (Ground floor) [13].

In clinical practice, logistical issues such as delays in booking patients into the system during peak hours in the emergency room can significantly skew the actual arrival time. This needs to be taken into account, and if this indeed appears to be a problem, separate registration for IVT patients should be considered.

The resident specialist, in collaboration with the radio operator and the emergency nurse, will perform a CT scan as a priority and an emergency assessment to eliminate the contraindications to IV thrombolysis.

For patients already hospitalized outside the neurology department or the Stroke Unit at the time of stroke onset, for example in a cardiology department, this definition cannot be used because these patients have already entered establishment before stroke onset. Thus, for this (small) subgroup, we propose to define the start of the DNT as the moment of the first consultation of the neurologist. Typically, this will be the phone call received by the neurologist.

Yet the time from hospital admission to treatment, door-to-needle time (DNT), is often delayed for avoidable reasons. Several studies report a short median DNT mainly in large referral tertiary hospitals equipped with a level 1 emergency department, a stroke team available 24/7 and neuroimaging facilities on site [14].

Considerable work has been done in single centers and multiple hospitals to improve door-to-needle time. There have been reductions of 8 to 47 Mn when applying one or more improvement strategies in a single center and there have been numerous multi-hospital initiatives. Treatment delays have been attributed to both patient and hospital factors and strategies to address these delays have been shown to reduce door-to-needle time [15].

The most effective strategies include advance notification of arrival by Emergency Medical Services (EMS), one-call activation of the stroke team, fast check-in process, moving the patient to computed tomography on an EMS stretcher and administration of Alteplase in the scanner [16].

At the EHU, our Neuro-Vascular sector was set up in January 2015 by setting up protocols for the care of patients presenting with a Neuro-Vascular emergency in collaboration with all the actors in the sector: Emergency physicians, Resuscitators, Neurosurgeons, Radiologists and Cardiologists [13].

The training of the emergency room doctors as well as the administrative and nursing staff was necessary in order to facilitate and improve the speed of the care pathway for the patient who is a candidate for thrombolysis. Patients with access to thrombolysis within 60 minutes are approximately 26.6% to 47.0% worldwide [17]. To maximize the benefits of IVT, all efforts should be directed towards reducing or even eliminating any delay in access to treatment.

If IVT is started within 90 minutes of stroke onset, the number needed to treat to achieve an excellent clinical outcome on the modified Rankin scale (0-1) is 4[18]. In the 180-270 minute time window, this number increases dramatically to 14.5[19]. In other words, a shorter delay between symptom and IVT, the so-called delay between symptom and needle, can mean the difference between being independent and being dependent. Reducing the time between symptoms and the needle requires overcoming several obstacles [20].

Most of the time is wasted in the pre-hospital period, the so-called door symptom time to the needle symptom time, mainly due to patients waiting to see a doctor. However, this is difficult to achieve because campaigns to raise awareness of stroke symptoms have only a limited impact on behavior.

Besides improving functional outcomes, a reduced DNT will also increase the proportion of patients eligible for IVT, as more patients can be treated before the 4.5 hour time limit. Unfortunately, more than 15 years after IVT was proven clinically effective, in most institutions DNT is still > 60 minutes for the majority of patients [21]. In most countries, national guidelines recommend that DNT not exceed this 60 minute limit. For example, a national initiative organized by the American Heart Association in partnership with other organizations aims to achieve a DNT ≤ 60 minutes for $\geq 50\%$ [22].

At the EHU, the Door to Needle time from 2015 to 2018 was greater than 60Mn, several factors were involved (poor triage of patients in the emergency room, lack of staff training, a scanner sometimes not available and above all a team made up of generalists). Many efforts have been made in training and those since the arrival of neurology residents who have invested in the decision to thrombolysed.

Streamlining triage, pre-notification systems, computerized alert systems in the hospital, or placing the CT scanner near the emergency room are all measures that can reduce DNT for stroke patients. Indeed, recent studies have shown that half of patients can be treated within 20 minutes [23]. Therefore, we advocate that in clinical care of stroke, emphasis should be placed on a reduction of DNT.

2- Time:

The hospital journey from door to needle is potentially prolonged by various patient-related and logistical factors such as uncertainty of symptom onset, blood pressure too high to start IVT, or incorrect triage. Ideally, as a measure of performance, DNT should not depend on patient-related factors because caregivers cannot influence them. The extent to which DNT will be influenced by patient-related factors will vary from hospital to hospital, depending on local protocols and policies [24-25]

For example, uncontrolled blood pressure contraindicating IVT will be actively lowered in some hospitals and thus lengthen the DNT, while in other hospitals the same patient would not be treated with IVT at all and therefore would not affect not the DNT. Other examples are so-called awakening strokes or when there is suspicion of mimic stroke, leading to further investigation (imaging) with subsequent lengthening of the DNT [22]. Another example is when there is initial uncertainty as to the exact time of onset of symptoms, an additional time investment in history taking might result in a positive IVT decision, but this also results in a DNT longer. This might prompt a search for a faster way to do this, such as a capillary blood measurement system, thereby significantly reducing DNT [27].

At the level of the UNV of the EHU, the patient goes up to the first floor directly after a CT scan, a standard and hemostasis assessment and an ECG, a place prepared by the UNV team already notified by the resident on call, as soon as the result of the scan the patient is already installed and scoped, the decision to thrombolysed will be taken quickly by the resident and the senior neurologist on call according to the results of the biology if there is a hypertensive peak or hyperglycemia, they will be lowered immediately.

During the Covid 19 period, a Covid19 thrombolysis unit was installed outside the emergency room until discharge, the sector was very slow at the start of the pandemic due to the non-availability of the scanner and the ignorance of the infection of the part of the nursing staff, moreover the candidate patients rarely presented to the emergency room during this period, which explains the low rate of thrombolysis in 2020, numbering 29 patients and an average DNT of 60 min [28].

V. Conclusion:

IV thrombolysis is a proven treatment for patients with acute ischemic stroke. The benefit of intravenous Rt-PA in acute ischemic stroke is highly time dependent.

At the EHU of Oran, the Neuro-Vascular sector set up since 2005 has made it possible to treat more than 200 patients thanks to this technique with spectacular results, a strategy of reduction and improvement of intra- hospital was developed to reduce the Door too Needle time, thus the current DNT is comparable to the recommendations of the ESO which is <60 min which therefore has a direct impact on the prognosis of patients.

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