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University of Diyala

Collage of Medicine

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Incidence of infection after stroke

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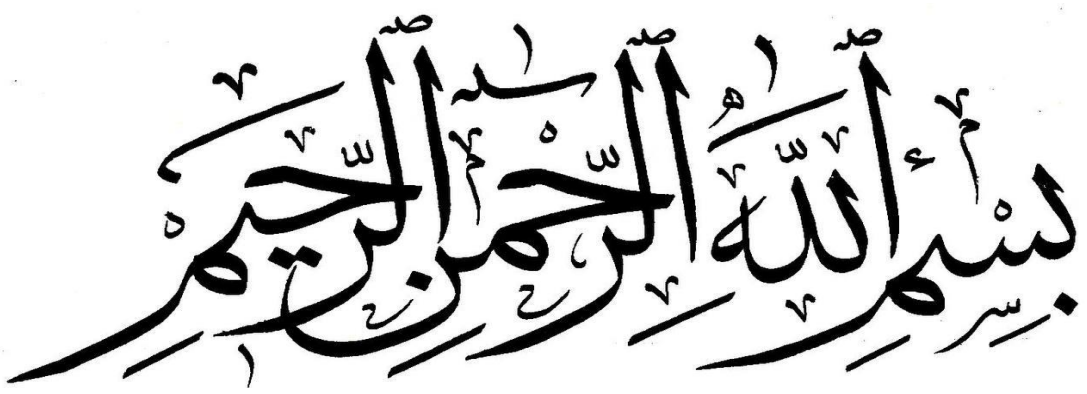


وَقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ]
[وَسَتُرَدُّونَ إِلَى عَالِمِ الْغَيْبِ وَالشَّهَادَةِ فَيُنَبِّئُكُمْ بِمَا كُنْتُمْ تَعْمَلُونَ

التوبة ــ ١٠٥

الاهداء

إلى من علَّمني كيف أقف بكل ثبات فوق الأرض

أبي المحترم

إلى نبع المحبة والإيثار والكرم

أمي الموَّقرة

إلى أقرب الناس إلى نفسي

أخواني وأخواتي وخطيبتي

إلى جميع الشهداء رحمهم الله

الى جميع من تلقيت منهم النصح والدعم من الاقارب والاصدقاء

اهديكم خلاصه جهدي العلمي

الشكر والتقدير

الحمدلله ألذي هدانا وأعدنا وأمدنا والهمنا الصبر على المشاق ووفقنا لما نحن عليه فله الحمد والشكر ابتداءاً وانتهاءاً

وارفع كلمة الشكر الى الأستاذ الدكتور وسام فالح وفقه الله فقد كان سندا لي على طول الطريق

والى كل من مد يد العون لي من قريب او بعيد

وقبل ان امضي اقدم اسمى ايات الشكر والامتنان والتقدير والمحبة الى الذين مهدوا لي طريق العلم والمعرفه

الى جميع اساتذتي الافاضل

ABSTRACT

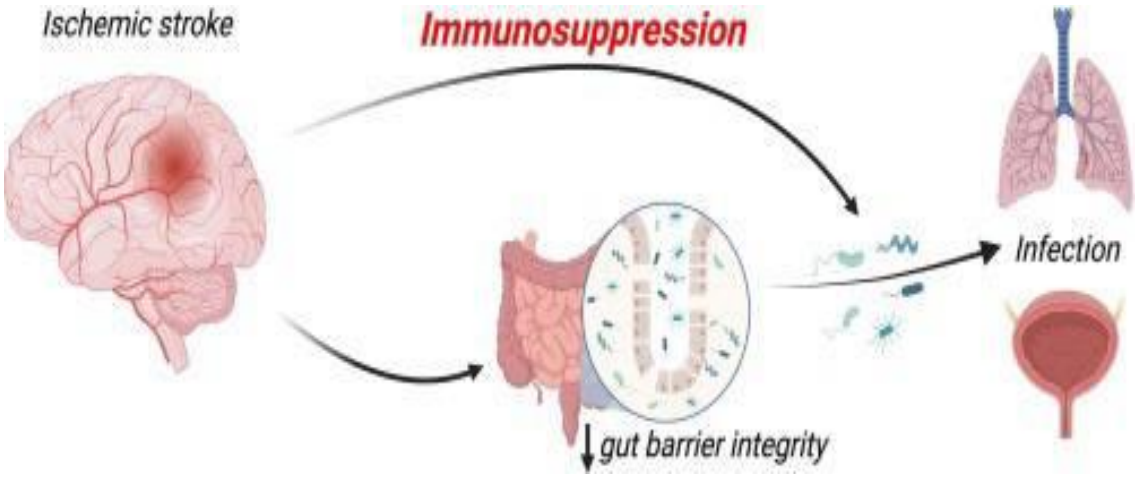
Stroke is a common medical emergency with an annual incidence of between 180 and 300 per 100 000. The incidence rises with age. One- fifth of patients with an acute stroke will die within a month of the event, and at least half of those who survive will be left with physical disability.

Is the 3rd leading cause of death and the most common cause of permanent disability in adult.

•Ischemic strokes represent 85%

• hemorrhagic strokes 14%

• venous strokes 1%



Introduction

A stroke, sometimes called a brain attack, occurs when something blocks blood supply to part of the brain or when a blood vessel in the brain bursts. stroke is the main cause of disability in high-income countries, and ranks second as a cause of death worldwide. [1-4]

In either case, parts of the brain become damaged or die. A stroke can cause lasting brain damage, long-term disability, or even death. There are two main causes of stroke: a blocked artery (ischemic stroke) or leaking or bursting of a blood vessel (hemorrhagic stroke). [5]Some people may have only a temporary disruption of blood flow to the brain, known as a transient ischemic attack (TIA), that doesn't cause lasting symptoms.[3]

Etiology of ischemic stroke.

A_ Vascular Disorders

- Atherosclerosis
- Inflammatory disorders
- Carotid or vertebral artery dissection
- Lacunar infarction
- Drug abuse
- Migraine
- Venous or sinus thrombosis

B_ Cardiac Disorders

Mural thrombus

Rheumatic heart disease

Arrhythmias

Endocarditis

Mitral valve prolapsed

C_ Hematological disorders

Polycythemia

Leukocytosis

Hypercoagulable state

Sickle cell disease

and it's clinical manifestation Sudden numbness or weakness in the face, arm, or leg, especially on one side of the body. Sudden confusion, trouble speaking, or difficulty understanding speech. Sudden trouble seeing in one or both eyes. Sudden trouble walking, dizziness, loss of balance, or lack of coordination. [2]

*The diagnosis of stroke is not difficult.

Thus, the diagnossis of stroke is clinical, and laboratory studies including brain imaging are used to support the diagnosis[7]

*Treating ischaemic strokes

- Thrombolysis – "clot buster" medicine.
- Thrombectomy.

- Aspirin and other antiplatelets.
- Anticoagulants.
- Blood pressure medicines.
- Statins.
- Carotid endarterectomy.[6]

Infection post stroke

Infection is a common complication in the acute phase after stroke. Reported infection rates after stroke vary considerably, ranging 5-65%.[9] Differences in patient populations, study design and definition of infection may account for these large variations in post stroke infection rates .[11] However, a reliable pooled estimate of the infection rate in patients with stroke is lacking. Pneumonia is the most common post-stroke infection and been associated with a relative risk of 3.0 for mortality in a study including 14293 patients with stroke [8]. Consequently, new treatment strategies, i.e. preventive antibiotics, are currently under investigation [10]. In this systematic review and meta-analysis we calculated the pooled post-stroke infection rates, identified study and population characteristics associated with infection, and estimated the impact of pneumonia on outcome after stroke. [13]

Patients and methods

*1.*Patient Population

Patients admitted to our stroke unit during one year were enrolled in the study if they (1) had symptoms and signs of an acute stroke, (2) were treated within 24 hours after symptom onset, (3) had a premorbid modified Rankin Scale score (mRS) of 0 to 1, and(4) gave informed consent. Patients were excluded from the study if they (1) had a hypoglycemia, or other causes of a new focal deficit, (2) had contraindications against magnetic resonance imaging (MRI), (3) were taking antibiotics, (4) were immunocompromised by chemotherapy or acquired immunodeficiency syndrome, (5) had severe comorbidities. Patient recruitment was performed prospectively. Written informed consent was obtained from all patients (or their legal guardian) prior to participating in the study[14]

2.Clinical Management and Data

The patients were treated according to the guidelines of management of acute ischemic stroke . The patients were screened on admission (day 1); demographic data, medical history including the presence of an infection in the last two weeks and medications prior to admission (specifically antibiotics) and risk factors, and vital signs were obtained. The temperature was measured continuously utilizing the temperature probe of the urinary catheter if placed or an axillary temperature probe. Clinical examination encompassed a general evaluation, the National Institute of Health Stroke Scale (NIHSS), and mRS . The patients received an electrocardiogram and a chest radiograph on day 1. Laboratory markers on admission included a complete blood count with differential, renal, and liver function tests, cardiac enzymes, and a urine analysis .All infections and procedures, presence of

dysphagia from admission through day 5, duration of hospital stay, the localization, and final etiology of the stroke according to the TOAST criteria were recorded. Hospital procedures included the placement of urinary catheters in patients with urinary incontinence, requiring close monitoring of the fluid balance or mechanical ventilation; central lines in patients with impaired peripheral venous access, with sepsis or other causes for hemodynamic instability, requiring mechanical ventilation or vasopressors; mechanical ventilation for respiratory failure or airway protection. [12-16]

3.Outcome Measures

The patients were screened for predefined infections until discharge: systemic inflammatory response (SIRS: two of the following criteria: temperature >38°C, <36°C; heart rate >90/min; respiratory rate >20/min, paCO2 <32 mm Hg, or mechanical ventilation; WBC >12 Gpt/L, <4 Gpt/L), and pneumonia (purulent sputum, fever >38°C; WBC >12 Gpt/L, <4 Gpt/L or, new infiltrate on chest radiograph, requirement for supplemental oxygen), urinary tract infection (urinary analysis with evidence of WBC and nitrite, increased CRP or WBC >12 Gpt/L, <4 Gpt/L or and/or clinical signs such as frequent urination, dysuria, flank pain, and/or positive urine culture), gastritis (confirmation by endoscopy, test for Helicobacter pylori). Pneumonia, SIRS, and sepsis were considered serious infections (requiring prolongation of hospitalization, causing neurological deterioration, and monitoring in the neurointensive care unit); upper respiratory, gastritis, and urinary tract infections (UTI) were defined as nonserious (no impact on neurological function, not requiring continuous monitoring). The infections were treated according to the national guidelines [15-19]

Results

A hundred patients were enrolled in the study from 2022 to 2023 with 78 case of ischemic stroke and 22 patient with hemorrhage stroke

The mean age was from 30 to 90 years , and 42% of the patients were male and 58% female.

The cause of stroke was atherothrombosis in (37%) of patients, cardioembolism in (22%) of patients, lacunar infarction in (23%), and cryptogenic in (16%) of patients according to the TOAST criteria.

The rate of infection in all patients was 62% (62/100 patients) and infection of those 24 patients had a nonserious and 38 a serious infection

Pneumonia was diagnosed in41 (41%)urinary tract infections in28(28%) , aphthous ulcer in 10 (10%) , superficial thrombophlebitis in 7 (7%) and gastritis in 5 patients (5%). Several demographic, clinical, and radiological variables on admission and during the hospital stay as well as markers of infection on days 1, 3, 5 were associated with a development of an infection or serious infection during the hospital stay . Among them, inclusion of the insular region, only present in large territorial middle cerebral artery (MCA) infarction, was significantly linked with infection after stroke

age	30-40	40-50	50-60	60-70	70…
Number of patient	5	9	16	27	43
History of hypertension	2	7	11	19	31
History of diabetes mellitus	1	1	7	12	22
Incidence of pneumonia	1	2	2	8	28
Incidence of UTI	2	4	3	5	14
Incidence of aphthous ulcer	1	1	3	-	5
Incidence of superficial thrombophlebitis	-	1	1	1	4
Incidence of gastritis	-	-	2	2	1

Table 1 : incidence of infection after stroke based on age

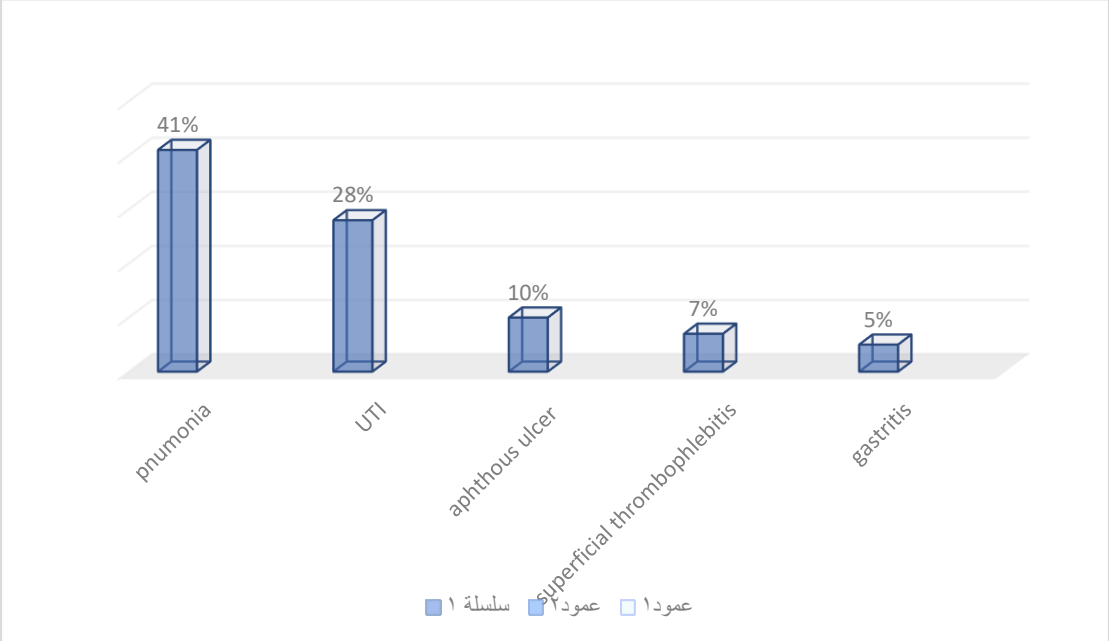


Figure 1 : incidence of infection after stroke

Discussion

Our study demonstrates the higher likelihood of infection after stroke for older patients with a more severe stroke. Patients with a severe stroke are more prone to a serious infection during the hospital stay. Infection had a detrimental impact on 3 months outcome after stroke. [18]

Aside from the randomized, double blind, placebo-controlled trials of prevention of infection after stroke with prophylactic antibiotic therapy and case control studies , this is the first clinical study to prospectively investigate predefined biomarkers and predictors of infection by means of scheduled blood collections for 6 laboratory infection markers, neuroimaging, and daily screening for the presence of an infection, to differentiate between nonserious and serious infection, and with the intention to identify a threshold using a combination of variables associated with infection to reliably predict the occurrence of an infection during the hospital stay after stroke in combination with long-term functional outcome. [22]

The infection rate in our patient population amounted to62%. The frequency of infection was higher than reported in other ischemic stroke populations . However, baseline NIHSS was higher 9.5 (0–24) in our stroke patients, and the patients were prospectively screened, whereas most of the study reports on infection after ischemic stroke are retrospective. The rate of pneumonia was41%, comparable to other reports . Since all patients were treated in a certified stroke and neurointensive care unit, measures to prevent aspiration and ventilator-

associated pneumonia in stroke patients might have kept the rate of pneumonia low while the overall rate of infection was high [24-26]

The relationship of infection risk and more severe stroke defined by higher NIHSS on admission or greater infarct volumes on neuroimaging seen in our patient population has been established . Several randomized trials demonstrated a reduction of infection rate in stroke patients by prophylactic administration of antibiotics but failed to show an impact on long-term functional outcome [20-29]

Conclusion

Infection is a common complication after stroke. There are different predictors for the occurrence of an infection that can be divided into: clinical factors, anatomical (stroke related) factors, and immunological factors. The majority of reviews show an independent association between the occurrence of a post-stroke infection and poor functional outcome and/or higher mortality. This mainly accounts for pneumonia; the relation between urinary tract infections and stroke outcome is doubtful. [21]

despite that overall infections are significantly reduced, preventive antibiotic therapy does not improve functional outcome or decrease mortality rates.[23]

This does not yet mean that research on preventive antibiotics in stroke should now be considered finished: a beneficial effect might still be applicable for certain antibiotic regimens and/or subgroups of patients. This is currently being studied. Besides, preventive antibiotic therapy might be cost-effective by increasing the QALYs.[30-31]

If proven that functional outcome may not be influenced by any antibiotic regimen, in any subgroup of patients, research for the upcoming years might put more emphasis on the effect of stroke on immunological alterations. Consequently, the next therapeutic opportunity to improve stroke outcome might be within immunological alteration.[25-27]

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