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Original article

Urinary tract infection after acute stroke: Impact of indwelling urinary catheterization and assessment of catheter-use practices in French stroke centers

suppl. Informations

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INFO ARTICLE

Article history:
Received 10 August 2016
Received in revised form
12 April 2017
Accepted 15 June 2017
Available online xxx

Keywords:
Acute stroke
Urinary retention
Urinary tract infection
Urinary catheterization

ABSTRACT

Introduction. – Urinary catheterization and acute urinary retention increase the risk of urinary tract infection (UTI). Our study aimed to investigate the incidence of UTI following acute stroke at our stroke center (SC) and to assess urinary catheter-care practices among French SCs.

Methods. – Stroke patients hospitalized within 24 h of stroke onset were prospectively enrolled between May and September 2013. Neurological deficit level was assessed on admission using the US National Institutes of Health Stroke Scale (NIHSS). Patients were followed-up until discharge. Indwelling urinary catheterization (IUC) was the only technique authorized during the study. An electronic survey was also conducted among French SCs to assess their practices regarding urinary catheterization in acute stroke patients.

Results. – A total of 212 patients were included, with 45 (21.2%) receiving indwelling urinary catheters. The overall estimated incidence of UTI was 14.2%, and 18% among patients receiving IUC. On univariate analysis, IUC was significantly associated with older age, longer hospital stays and higher NIHSS scores. Of the 30 SCs that responded to our survey, 19 (63.3%) declared using IUC when urinary catheterization was needed. The main argument given to justify its use was that it was departmental policy to adopt this technique. Also, 27 participants (90%) stated that conducting a study to assess the impact of urinary catheterization techniques on UTI rates in acute stroke patients would be relevant.

Discussion. – Our results are in accord with previously reported data and confirm the high burden of UTI among acute stroke subjects. However, no association was found between IUC and UTI on univariate analysis due to a lack of statistical power. Also, our survey showed high heterogeneity in catheter-use practices among French SCs, but offered no data to help determine the best urinary catheterization technique.

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https://doi.org/10.1016/j.neurol.2017.06.029

Please cite this article in press as: Net P, et al. Urinary tract infection after acute stroke: Impact of indwelling urinary catheterization and assessment of catheter-use practices in French stroke centers. Revue neurologique (2018), https://doi.org/10.1016/j.neurol.2017.06.029

Conclusion. – Urinary catheterization is common after acute stroke and a well-known risk factor of UTI. However, as high heterogeneity in catheter-use practices is found among French SCs, randomized studies comparing the efficacy of urinary catheterization techniques in terms of UTI prevention in acute stroke patients are now warranted.

1. Introduction

Infection is the second most common complication of acute stroke [1] with an estimated incidence of 30% [2], mostly represented by urinary tract infection (UTI). Many studies have already been conducted in this field, and have shown an estimated UTI incidence of between 6.9% and 27.3% in acute stroke patients [2–11], although a recent meta-analysis found an incidence of 10% [2].

UTI is associated with poorer outcomes, increased morbidity and longer hospital stays, and may hamper stroke rehabilitation. It is also a well-known factor behind increased hospital costs, estimated to range from $775 to $1500 per catheter-associated UTI (CAUTI) [10,12]. Although at an individual level this may seem low, these additional costs become substantial considering the number of UTIs on a hospital scale.

Acute urinary retention (AUR) within 72 h of a stroke is also a common complication, with an estimated incidence of 29% [4]. Urinary catheterization is the standard care for AUR management and can be achieved using either indwelling urinary catheterization (IUC) or intermittent urinary catheterization (IMC). Each technique has its own advantages and drawbacks, yet there are no clear guidelines suggesting the use of any specific urinary catheterization technique for AUR management in acute stroke patients.

Both AUR and urinary catheterization have been described as risk factors for UTI by favoring bacterial growth [4,10,13]. Management of these risk factors could decrease the incidence of UTI, improve acute stroke rehabilitation and lead to lower hospital costs.

Our present study aimed to estimate UTI and CAUTI rates after acute stroke in our neurological intensive care unit (neuro-ICU), and to assess the relationship between urinary catheterization and frequency of UTI. A survey was also conducted among French SCs to assess their practices regarding urinary catheterization in acute stroke patients.

2. Methods

This prospective observational single-center study was conducted over a 4-month period between May and September 2013. Consecutive acute stroke admissions to our SC during the study period were assessed. The inclusion criterion was having a first or recurrent ischemic or hemorrhagic stroke within 24 h of admission. Non-inclusion criteria were patients admitted to the neuro-ICU with a confirmed non-stroke diagnosis, stroke admission $>$ 24 h after stroke onset, or stroke admission or discharge with a urinary catheter.

The stroke diagnosis was made on clinical grounds and supported by computed tomography or magnetic resonance imaging brain scans. A urinary dipstick was systematically used for every patient admitted to the neuro-ICU.

Bladder volume was monitored, using a BladderScan® ultrasound device (Verathon Inc., Bothell, WA, USA), every 3 h during the first 48 h of admission. An AUR diagnosis was confirmed when bladder volume was $>$ 450 mL and followed by urinary catheterization. IUC was the only urinary catheterization technique authorized to treat AUR patients during the study. Urine culture was systematically performed immediately after IUC was set up.

The included patients were divided into two groups: those with IUC; and those without IUC. The following parameters were recorded: demographic data; length of hospital stay; presence of diabetes mellitus; and presence of UTI. The impairment level of each patient was rated at admission, using the US National Institutes of Health Stroke Scale (NIHSS), by a trained physician. For the with-IUC group, the time lag from stroke symptom onset to catheterization and duration of catheterization were also recorded. IUC insertion was prescribed by the medical staff of the neuro-ICU, and daily surveillance of the IUC was established for catheterized patients until removal of the catheter or discharge from the neuro-ICU. Diagnosis of UTI was determined according to the French Enquête Nationale de Prévalence (ENP; National Enquiry of Prevalence) 2012 criteria [14] (Annex 1).

Finally, an electronic survey was conducted among French SCs to assess their practices regarding acute stroke urinary catheterization. The survey consisted of four questions (Annex 2), and was conducted over a 1-month period, with a reminder sent 2 weeks after the beginning of the survey.

The present study was approved by both the French Commission Nationale de l'Informatique et des Libertés (CNIL; National Commission for Information Technology and Civil Liberties) and Comité de Protection des Personnes (CPP; Committee for the Protection of Individuals) Île-de-France VII. No informed consent was required for studying the incidence of UTI.

Statistical analysis: this study compared clinical characteristics and outcomes between patients with IUC during hospitalization and those without IUC. Data were expressed as means ± standard deviation (SD), as medians or as frequencies (%) where appropriate. Based on previous publications and the number of stroke patients admitted last year, our SC expected a UTI rate of at least 10% among patients admitted during the 4-month study period.

Continuous variables were compared using a *t*-test, and categorical variables by Chi^2 test. All analyses and calculations were performed using XLSTAT 2014 software. A probability (*P*) value $<$ 0.05 (two-sided) was considered statistically significant.

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