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Gastrostomy in Hospitalized Patients with Acute Stroke: "NöroTek" Turkey Point Prevalence Study Subgroup Analysis

Hastanede Yatan Akut İnmeli Hastalarda Gastrostomi: "NöroTek" Türkiye Nokta Prevalans Çalışması Alt Grup Analizi

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Abstract

Objective: Nutritional status assessment, dysphagia evaluation and enteral feeding decision are important determinants of prognosis in acute neurovascular diseases.

Materials and Methods: NöroTek is a point prevalence study conducted with the participation of 87 hospitals spread across all health sub regions of Turkey conducted on 10-May-2018 (World Stroke Awareness Day). A total of 972 hospitalized neurovascular patients [female: 53%, age: 69±14; acute ischemic stroke in 845; intracerebral hematoma (ICH) in 119 and post-resuscitation encephalopathy (PRE) in 8] with complete data were included in this sub-study.

Results: Gastrostomy was inserted in 10.7% of the patients with ischemic stroke, 10.1% of the patients with ICH and in 50% of the patients with PRE. Independent predictors of percutaneous endoscopic gastrostomy (PEG) administration were The National Institutes of Health Stroke Scale score at admission [exp (β): 1.09 95% confidence interval (CI): 1.05-1.14, per point] in ischemic stroke; and mechanical ventilation in ischemic [exp (β): 6.18 (95% CI: 3.16-12.09)] and hemorrhagic strokes [exp (β): 26.48 (95% CI: 1.36-515.8)]. PEG was found to be a significant negative indicator of favorable (modified Rankin's scale score 0-2) functional outcome [exp (β): 0.032 (95% CI: 0.004-0.251)] but not of in-hospital mortality [exp (β): 1.731 (95% CI: 0.785-3.829)]. Nutritional and swallowing assessments were performed in approximately two-thirds of patients. Of the nutritional assessments 69% and 76% of dysphagia assessments were completed within the first 2 days. Tube feeding was performed in 39% of the patients. In 83.5% of them, tube was inserted in the first 2 days; 28% of the patients with feeding tube had PEG later.

Conclusion: The NöroTek study provided the first reliable and large-scale data on key quality metrics of nutrition practice in acute stroke in Turkey. In terms of being economical and accurate it makes sense to use the point prevalence method.

Keywords: Stroke, intracerebral hemorrhage, malnutrition, dysphagia, flash mob

Öz

Amaç: Akut nörovasküler hastalıklarda nütrisyonel durum ve disfaji değerlendirmesi ve enteral beslenme kararı önemli prognoz belirleyicilerindendir.

Gereç ve Yöntem: NöroTek, 10 Mayıs 2018'de (Dünya İnme Farkındalık Günü) Türkiye'nin tüm sağlık alt bölgelerine yayılmış 87 hastanenin katılımıyla gerçekleştirilen bir nokta prevalans çalışmasıdır. Hastanede yatan ve bu alt çalışma için toplanan verisi tam olan toplam 972 nörovasküler hasta (kadın: %53, yaş: 69±14 yıl; 845'i akut iskemik inme; 119'u intraserebral hematom ve 8'i post-resüsitasyon ensefalopatisi) analiz edildi.

Bulgular: Gastrostomi iskemik inmeli hastaların %10,7, intraserebral kanamalıların %10,1 ve post-resusitasyon ensefalopatisi olanların %50'sine uygulanmıştır. Perkütan endoskopik gastrostomi (PEG) gereksiniminin bağımsız belirleyicileri, iskemik inme grubunda kabul NIHSS [exp (β): 1,09, %95 güven aralığı (GA): 1,05-1,14, puan başına] ile hem iskemik hem de hemorajik inmelerde mekanik ventilasyon uygulanmış olmasıdır [iskemik için: exp (β): 6,18, %95 GA: 3,16-12,09] ve hemorajik inme için: [exp (β): 26,48, 95% GA: 1,36-515,8]. İnme olgularında PEG uygulaması hastane içi mortalite için bağımsız belirleyici değildi [exp (β): 1,731, 95% GA: 0,785-3,829]. Ancak, PEG uygulanmış olması taburculuk esnasında iyi prognoza (modifiye Rankin skoru 0-2) sahip olabilme için anlamlı bir negatif etmen olarak bulundu [exp (β): 0,032, %95 GA: 0,004-0,251]. Hastanede yatan nörovasküler hastaların yaklaşık üçte ikisinde malnütrisyon ve yutma bozukluğu açısından değerlendirme yapılmıştı. Nutrisyonel status değerlendirmesinin %69'u ve disfaji değerlendirmesinin %76'sı ilk 48 saat içinde gerçekleştirilmişti. Tüple enteral nütrisyon uygulama oranı %39'du. Beslenme tüplerinin %83,5'i ilk 2 gün içinde yerleştirilirken beslenme tüpü olan hastaların %28'ine daha sonra PEG açılmıştı.

Sonuç: NöroTek çalışması ile Türkiye'de hastanede yatan akut inme hastalarında nutrisyonel uygulamaların temel kalite ölçütlerine ilişkin ilk güvenilir ve büyük ölçekli veri sağlanmıştır. Ekonomik olması ve doğruluğu açısından nokta yaygınlık yönteminin bu tip verilerin temini için daha fazla kullanılması mantıklıdır.

Anahtar Kelimeler: İnme, intraserebral kanama, malnütrisyon, disfaji, anda güruh

Introduction

Early nutrition and swallowing evaluation, designing an individual feeding plan and its implementation are of critical prognostic importance in acute ischemic and hemorrhagic stroke care. There are no reliable data on the nutritional practice status of hospitalized patients with acute stroke in Turkey. Large-scale data on nutritional and swallowing assessment, feeding tube or gastrostomy enteral feeding practices extracted in a population representative of Turkey from the "NöroTek" point-prevalence study (1) are herein presented.

Materials and Methods

The NöroTek Study is based on the data of patients hospitalized in the neurology inpatient clinics of 87 hospitals participating in the study on World Stroke Awareness Day, May 10, 2018. It was ensured that 30 health service regions in Turkey could be represented at the proportion of their population. This patient population was followed throughout their hospital stay.

The NöroTek study was initiated with the approval of Hacettepe University Non-Interventional Ethics Committee for clinical studies consortia (decision no: GO 18/331-16). Written consent was obtained from the patients for data sharing and kept at the participating centers. The NöroTek Study was conducted at the initiative of the researchers, and no financial support was received from industry or any other parties. The method and overall patient profile of the study were published in detail elsewhere (1). A focused summary within the perspective of the current subgroup analysis is presented herein.

The collected data included descriptive demographic information, previous hospitalization(s) and current admission. Vascular risk factors/diseases such as hypertension, diabetes mellitus, smoking, dyslipidemia, atrial fibrillation, coronary artery disease, and history of stroke were determined for neurovascular diseases including ischemic stroke, transient ischemic attack, hemorrhagic stroke, cardiopulmonary arrest, and persistent vegetative state. Initial and follow-up parenchymal and vascular imaging, etiological work-up, treatments, procedures, infectious, and other complications such as pneumonia during hospital stay were recorded in detail.

Discharge destination and functional status [modified Rankin's scale score-(mRS)] (2), survival and cause of death were determined. American National Institutes of Health Stroke Scale (NIHSS) score (3), acute treatments such as intravenous (IV) tissue plasminogen activator (tPA) and/or neuro-thrombectomy, in-hospital treatments including preventive measures and general/quality metrics were determined in patients with ischemic stroke. Localization and volume of hematomas were noted in cases of intracranial hemorrhage.

The NöroTek Study contains four questions about nutrition; swallowing ability, assessment of nutritional status, enteral feeding tube insertion and percutaneous endoscopic gastrostomy (PEG) administration along with their application date. A researcher briefing was held on 6 May 2018 regarding these questions.

Statistical Analysis

All values were presented as "mean ± standard deviation", "mean [95% confidence intervals (CI)]" or "median ± interquartile range (IQR)", "numbers", or "percentages". Distribution normality was checked appropriately with Kolmogorov-Smirnov and Shapiro-Wilk's W tests. Student's t and Mann-Whitney U tests were used to compare numerical variables, and chi-square and Fisher's Exact tests for categorical variables. Multivariate/linear regression models were constructed to adjust for factors with $p<0.1$ after univariate comparisons to explore their association with PEG, mortality and functional endpoints. Statistical significance was set at p value <0.05. SPSS software (version 22.0; IBM Corp. SPSS Statistics for Windows, Armonk, NY, USA) was used for all analyses.

Results

Patients

A total of 972 neurovascular patients (female: 53.2%, age: 69±14, range 18 to 96 years) with acute ischemic stroke (n=845), intracerebral hematoma (n=119) and post-resuscitation encephalopathy (n=8) whose data were revised and confirmed were included in the present sub analysis of NöroTek Study. Seven hundred and sixty-eight patients (79%) were hospitalized within the first 24 hours of symptom onset. IV tPA was used in 103 (12%) patients. Acute neuro-endovascular treatment was used in 71 (8%) patients. The length of stay in the hospital was quite variable, with a median of 13 (IQR: 7-25, range 1 to 323) days.

Percutaneous Gastrostomy

PEG was inserted in 106 (10.9%) patients. Gastrostomy insertion rate was 10.7% (n=90) in ischemic stroke, 10.1% (n=12) in intracerebral hemorrhage, and 50% (n=8) in post-resuscitation syndrome. PEG was administered in 20 (3.5%) of 571 (79% of total) patients who were hospitalized for neurological diseases other than neurovascular disease and whose nutritional data were

complete. The latter was not further analyzed in this sub-study. PEG insertion rate was 6.9% in stroke-ready hospitals (n=58 patients), 7.5% in primary stroke centers (stroke unit, n=321) and 13.2% in comprehensive stroke centers (n=593).

If the average length of stay in these centers is assumed to be 15 days, the annual number of PEGs in the hospitals participating in our study can be calculated as 106x24=2544 and the number of patients with stroke as twenty-five thousand. Considering that there are one hundred fourty thousand ischemic and fourty thousand hemorrhagic strokes in Turkey according to the estimated figures, the annual number of PEGs at the national level can be predicted to be around eighteen thousand.

The characteristics of neurovascular patients who had and did not have PEG are summarized in Table 1.

The patients, especially patients with ischemic stroke, who underwent PEG was significantly older (p=0.008). The rate of PEG was found to be higher in patients who were transferred from district hospitals than patients who were admitted directly to the emergency department of the current hospital. Mechanical ventilator use was correlated with PEG insertion in all patients with both ischemic and hemorrhagic stroke (p<0.001). Recurrence was numerically associated with PEG insertion in both ischemic (p=0.059) and hemorrhagic strokes (p=0.082).

In univariate analysis, other predictive factors for PEG insertion were coronary artery disease (p=0.025), mechanical thrombectomy (p=0.004) and high NIHSS score (almost 2-fold, p<0.001) in patients with ischemic stroke, hematoma volume at admission was higher in PEG inserted patients but this finding was not statistically significant (p=0.058). Multivariate analysis revealed that NIHSS score at admission [(exp (β): 1.09 (95% CI: 1.05-1.14, per point)] and mechanical ventilation [(exp (β): 6.18 (95% CI: 3.16-12.09)] were independently associated with PEG insertion in patients with ischemic stroke after adjustment. In patients with intracerebral hematoma, multivariate analysis indicated a significant correlation between the use for mechanical ventilation and PEG [exp (β): 26.48 (95% CI: 1.359-515.802)], while association with hematoma volume at admission remained only marginally significant [(exp (β): 1.025 (95% CI: 0.998-1.053, per cc)]. Other factors were not independent predictors of PEG insertion.

In patients with ischemic and hemorrhagic strokes with PEG insertion, pneumonia and urinary tract infections were more common during hospital stay. Length of hospital stay was approximately 3 times higher in patients with PEG. PEG correlates with higher (approximately 4 times) in-hospital mortality and lower discharge-to-home and good functional recovery at discharge (Table 1).

In the multivariate analysis, in-hospital mortality in patients with ischemic stroke was found to be associated with age [exp (β): 1.032 (95% CI: 1.002-1.064)], NIHSS score at admission [exp (β): 1.084 (95% CI: 1.033-1.137, per point)] and mechanical ventilation use [exp (β): 12.801 (95% CI: 5.774-28.378)], but not with PEG insertion [exp (β): 1.731 (95% CI: 0.785-3.829)]. However, PEG was found to be a significant negative predictor of favorable outcome (mRS 0-2) at discharge [(exp (β)=0.032 (95% CI: 0.004-0.251)] together with age [(exp (β): 0.965 (95% CI: 0.947-0.983)], NIHSS score (exp (β): 0.858 (95% CI: 0.823-0.893)] and mechanical ventilation [exp (β): 0419 (95% CI: 0.213-0.823)].

Nutritional Metrics

Nutritional evaluation was not performed in 15% patients with ischemic stroke with PEG insertion, while this was up to one-third in patients with hemorrhagic stroke and ischemic patients without PEG. In total, nutritional assessment was not performed in 32% of patients. In the remainder, this assessment was made within an average of 3.1±4.8 days following hospitalization. There was no significant difference between patients with and without PEG (mean 3.1 vs. 5.3; days, p=0.073, Table 1). Nutritional evaluation was performed on the first day in 35% and on the second day in 34% of those who had PEG. In the patients who did not undergo PEG, nutritional evaluation was made on the first day in 43.5% and on the second day in 31.4%.

Swallowing (dysphagia) assessment was never performed in 31% of patients. In the remainder, evaluation was performed within an average of 3.2±6.5 days. Dysphagia assessment was not performed in 22% of patients with ischemic stroke and 8% of patients with hemorrhagic stroke who underwent PEG. This tended to be higher in those who did not need PEG (32% in both groups). Dysphagia evaluation was performed approximately 2 days later in patients with subsequent PEG insertion (mean day, 3.1 vs. 5.3, p=0.129, Table 1). Decision for swallowing was made in 49% of these patients on the first day and in 27% on the second day. Swallowing was evaluated in 56% of patients on the first day and in 22% of patients on the second day in patients who did not undergo PEG. Patients with ischemic stroke who were evaluated for swallowing were older (70±13 vs. 67±14, p=0.003) and had higher NIHSS scores at admission (10±7 vs. 8±7, p=0.004). Intracerebral hematoma volume was not different in those evaluated for swallowing (28±50 to 20±23, p=0.396).

Tube feeding was inserted in 39% of the patients. Swallowing test was not performed in 13.6% of tube-fed patients, and nutritional assessment was not performed in 14.9% of them. All but one of the patients who had ischemic stroke and intracerebral hemorrhage with PEG in the follow-up were previously fed with a feeding tube. Feeding tube was inserted in 29% of patients with ischemic stroke without PEG and in 43% of patients with hematoma (Table 1). In the PEG group, feeding tube was inserted in 53.5% on the first day and 30% on the second day. Feeding tube was inserted in 54% on the first day and 28.5% on the second day of those who did not have PEG inserted. There was no difference in terms of feeding tube insertion time between patients with and without PEG. PEG was inserted later in 28% of the total tube-fed patients.

The mean insertion time of PEG was 38±28 days (median IQR: 28±22, Figure 1). Of patients with PEG, 36% died during their hospital stay. The PEG insertion time in these patients was 41±39 days. PEG was inserted in the post-stroke second week in 6% of the patients, in the third week in 14%, in the fourth week in 25% and after the first month in the remainder (55%). The duration of hospitalization from PEG insertion to death was 34±33 days. In surviving patients, PEG was inserted after an average of 37±21 days. And they were discharged 26±21 days after the procedure.

Discussion

One of the pre-planned subgroup analyzes of the NöroTek-Turkey study was about PEG applications during acute stroke admission. In this sub-study, the first data representing our

Table 1. Clinical parameters by PEG status

	All			Ischemic stoke			Hemorrhagic stroke		
	PEG (+)	**PEG (-)**	**p**	**PEG (+)**	**PEG (-)**	**p**	**PEG (+)**	**PEG (-)**	**p**
n	106	866	-	90	755	-	12	107	-
Age	73±11	68±14	0.001	73±11	69±14	0.008	74±12	66±15	0.056
Female %	55	54	0.807	52	53	0.854	58	56	0.881
Marital status, married, %	71	74	0.953	72	74	0.937	67	73	0.904
Marital status, widowed, %	24	22		24	22		25	10	
Education, less than secondary school, %	76	75	0.699	76	78	0.607	72	72	0.971
Direct emergency unit admission, %	66	76	<0.001	66	76	0.001	67	76	0.005
Hospitalization on the first day, %	79	79	0.969	81	79	0.616	64	83	0.115
Hypertension, %	69	71	0.795	71	70	0.891	71	72	0.991
Diabetes, %	43	36	0.168	43	38	0.310	43	16	0.085
Dyslipidemia, %	33	31	0.678	35	32	0.642	29	19	0.535
Active smoking, %	8	17	0.076	9	17	0.161	0	19	0.295
Atrial fibrillation (all), %	33	29	0.397	37	30	0.204	0	11	0.353
Coronary heart disease, %	41	31	0.053	44	33	0.025	0	17	0.308
Recurrent stroke, %	31	22	0.044	32	23	0.059	33	10	0.082
Neuro-thrombectomy, %	-	-	-	17	8	0.004	-	-	-
IV tPA, %	-	-	-	17	11	0.156	-	-	-
NIHSS	-	-	-	16±8	8±7	<0.001			
Admission hematoma volume, ml	-	-	-	-	-	-	49±50	23±43	0.058
Dysphagia evaluation, %	80	68	0.011	78	68	0.062	92	68	0.088
Dysphagia test day	5±12	3±6	0.128	5±12	3±6	0.129	11±28	4±6	0.062
Nutrition evaluation, %	83	64	<0.001	85	64	<0.001	67	63	0.790
Nutrition evaluation day	5±9	3±5	0.073	5±9	3±5	0.076	4±8	3±4	0.439
Feeding tube, %	98	31	<0.001	97	29	<0.001	100	43	<0.001
Feeding tube placement day	3±4	3±4	0.968	3±4	2±5	0.697	2±1	2±3	0.410
Mechanical ventilation, %	70	17	<0.001	68	16	<0.001	83	21	<0.001
Pneumonia, %	53	22		54	21		50	29	
Pneumonia +UTI, %	28	4	<0.001	28	4	<0.001	30	8	0.041
UTI, %	7	4		9	3		0	5	
DVT/PTE	9	4	0.227	9	3	0.102	14	13	0.886
Length of stay, days	61±48	18±21	<0.001	61±51	17±20	<0.001	62±37	22±21	<0.001
Mortality, %	36	8	<0.001	36	8	<0.001	42	12	0.018
Discharged to home, %	52	87	<0.001	48	87	<0.001	80	75	0.263
Discharge mRS 0-1-2	2.3	56	<0.001	2.7	58	<0.001	0	42	0.007
Discharge mRS 0-1	1.1	39	<0.001	1.4	41	<0.001	0	26	0.056

IV tPA: Intravenous tissue-type plasminogen activator, ml: Milliliters, mRS: Modified Rankin's scale, NIHSS: The National Institutes of Health Stroke Scale, PEG: Percutaneous endoscopic gastrostomy, UTI: Urinary tract infection, DVT: Deep vein thrombosis, PTE: Pulmonary thromboembolism

country were produced on the frequency, time, and determinants of PEG insertion, as well as the rates and times of swallowing and nutritional assessment, along with feeding tube administration in patients with acute stroke.

The rate of PEG insertion in acute stroke varies between 6.3-18.4% (4,5,6,7,8). In our series, the rate of PEG insertion was approximately 10% during admission for ischemic and hemorrhagic strokes. Heterogeneity in PEG insertion rates is closely related to demographics, comorbidity status, clinical and hospital/logistical factors (9,10). In our study, we determined that the clinical severity of neurovascular diseases was the main independent predictor of PEG insertion. In this context, the need for mechanical ventilation and NIHSS scores at admission were independent predictors for PEG decision among patients

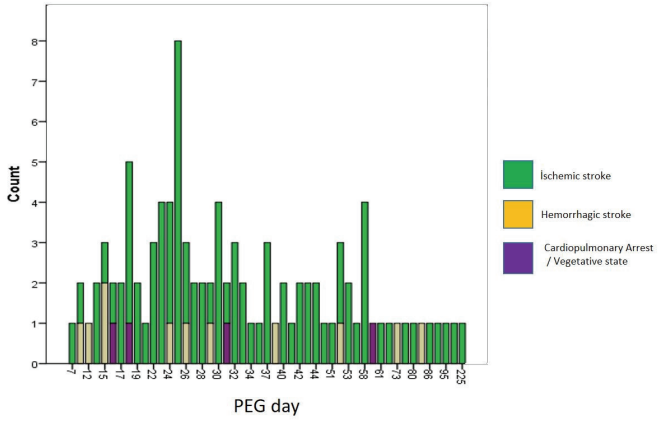

Figure 1. PEG insertion time
PEG: Percutaneous endoscopic gastrostomy

with ischemic stroke. In addition, advanced age, transfer from a peripheral hospital to a comprehensive one, recurrent events and neuro-thrombectomy were correlated with PEG insertion in ischemic stroke per univariate analysis. Admission volume was associated with PEG insertion in intracerebral hematomas. Similar to ours, the majority of previous studies in ischemic stroke documented a significant association between higher NIHSS scores at admission and PEG insertion (4,5,9,11,12), while some studies found a correlation between advanced age (5,9) and large (9) or bihemispheric (12) infarcts and PEG insertion. Hematoma volume and clinical severity (Glasgow Coma scale score) at admission and age were associated with PEG insertion in intracerebral hematomas in the German literature (6,7,8).

As an epiphenomenon of clinical severity, PEG insertion appeared to be associated with stroke-related pneumonia, a combination of pneumonia and urinary tract infection, longer hospital stay, higher hospital mortality, and fewer discharge-to-home. However, when examined in multivariate settings, age, NIHSS, and need for mechanical ventilation were found to be independent predictors of in-hospital mortality, but not PEG insertion. However, according tothese parameters in discharged patients, PEG insertion was an indicator of poor functional outcome.

Current guidelines recommend insertion of a PEG tube between post-stroke 14-28 days in acute stroke patients, if it is estimated that the patient will not be able to self-sustain adequate nutrition and hydration orally for more than one month (13,14,15). In our study, the rate of PEG insertion in patients with stroke during this period (day 14 to 28) was 39%. PEG was inserted after the first month in more than half of our patients. However, in real-world data, the post-stroke PEG insertion time started to happen earlier. For example; an American nationwide data indicated that PEG was inserted earlier with a median 7 days, that is, within a quarter of that in our series, and the rate of insertion was only 15% at the third week and later (10). Considering that patients who underwent PEG insertion stayed in the hospital for another one month after PEG, the rather longer hospital stay that needs to be corrected in our series is notable.

According to our study, almost two-thirds of patients with acute stroke in Turkey had a kind of nutritional assessment during their hospital stay. Nutritional assessment in stroke can be performed informally (eyeball prediction) or formally (using structured scales such as Subjective Global Assessment and Mini Nutritional Assessment) (16,17). Each of these methods is considered valid. In the FOOD study, the evaluation was made informally (18). However, these different assessment methods have led to the reporting of malnutrition frequency at admission in a wide range of 6-60% in patients with stroke (17). If the method is not similar, it is not possible to compare the results. We think that in most of the patients reported in our study informal nutritional evaluation was made. However, we did not try to determine the method used and its result, namely the frequency of malnutrition or malnutrition risk. But, the fact that one third of all patients and even 15% of those who had PEG insertion did not have any nutritional evaluation pointed out a critical deficiency to be remedied in our centers.

Dysphagia was not evaluated during hospitalization in one third of the neurovascular patients included in our study. Assessment of swallowing function was not performed in the first two days in one-fifth of them. It was noted that dysphagia evaluation was not even performed in one fifth of patients with ischemic stroke who had PEG inserted. Still, our results indicate that dysphagia assessment is made in a timely manner in a significant proportion of patients in the acute phase of stroke in Turkish hospitals. Dysphagia screening method was not coded in this study. The lack of determination of the use of instrumental assessments such as video-fluoroscopic swallow study and flexible endoscopic swallowing assessment can be noted as a shortcoming of our study. However, we already know from our national meetings that these tests are not very commonly done or frequently available in our country. The most commonly used screening protocol in our country is either the clinical opinion of the attending neurologist or the water swallow test performed by a neurologist or a clinical neurology nurse. In this test, the patient is given a predefined volume (usually 50 or 90 ml) of water and if clinical signs of aspiration (cough, voice change, and stridor) occur during or after drinking, the test is considered positive and the patient is placed on a "non-oral" nutritional strategy. If the patient passes the water drinking test, oral feeding is allowed. Other than the water drinking test, multiple consistency swallowing assessment tests are available and recommended (13). However, we did not investigate to what extent they were used.

In our study, it was determined that approximately two-fifths of stroke patients had tube feeding at some point during acute hospitalization. Enteral feeding tube insertion was performed on the first day in half of the patients and on the second day in one fourth. Approximately one third of the feeding tube inserted patients required PEG afterward. This finding shows that tube feeding is a common and standard practice in acute stroke care in Turkey.

The NöroTek study used a method which is a combination of "Flash Mob Research (FMR)" (19) and "point prevalence study (PPS)" (20) that are not very common in the stroke field but have important examples in the field of nutrition sciences. PPS is a frequently used method especially in infectious diseases (21,22). FMR is a method that allows us to collect very clear and few qualitative data from a large number of centers and patients in a very short time. PPS, on the other hand, aims to determine the proportion of people in a particular population who have a particular problem at a particular time. The most prominent

examples are delirium day research (23) and nutrition day surveys (24). In contrast to FMR, a PPS can use a follow-up over a period of time using usually a short or a multi-question questionnaire. NöroTek included a short follow-up period after the identification of the population and simple questions with clear answers were collected. By its nature, in this type of snapshot research, the data form should focus on questions with simple and definite answers, not sophisticated ones.

Study Limitations

Although bringing many innovations, the NöroTek study had some limitations. The number of patients with a diagnosis of cardiopulmonary arrest and persistent vegetative state was well below the ability to make a definite conclusion. Data such as malnutrition and malnutrition risk and methods to detect them, the swallowing assessment method used, and who made the assessment were not included in the form. The reasoning behind the study and prediction of heterogeneity played a role in this decision (to simplify the nutritional survey). Although the data cleaning and publication preparation were delayed due to the pandemic, the study retains its value since it becomes impossible to repeat due to changing conditions during the pandemic, but now similar circumstances have been returned.

Conclusion

In conclusion, the NöroTek study provided the first reliable data on nutritional quality metrics in acute stroke practice in Turkey using the point prevalence method. The presented data are a first in terms of reflecting Turkey as a whole and have the potential to form the basis for strategic planning regarding acute hospital nutrition in stroke.

Ethics

Ethics Committee Approval: The NöroTek study was initiated with the approval of Hacettepe University Non-Interventional Ethics Committee for clinical studies consortia (decision no: GO 18/331-16).

Informed Consent: Written consent was obtained from the patients for data sharing and kept at the participating centers.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: All authors, Concept: M.A.T., A.O.Ö., E.M.A., Design: M.A.T., A.O.Ö., E.M.A., Data Collection or Processing: All authors, Analysis and Interpretation: M.A.T., Literature Search: M.A.T., Writing (first draft): M.A.T., Writing (review & editing): All authors.

Conflict of Interest: No conflict of interest was declared by the authors.

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