



STROKE IN YOUNG

Neurology

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ABSTRACT

Stroke in younger age group is an important entity and needs to be approached differently. Although less common, its impact on individual as well as society in terms of economic and social burden is far greater. Initial approach needs to be extensive keeping in mind the more diverse differential diagnoses of stroke in young. In this article we give an overview of the important risk factors and etiology of stroke in young. When it comes to treatment, primary prevention takes the lead and aggressive approach to reduce known risk factors is essential. However as far as specific recommendations and guidelines are concerned, there is a lack of such data for stroke in young. Further research on a larger scale, with standardized methodology, is required to yield more precise epidemiologic data.

KEYWORDS

INTRODUCTION

Stroke is one of the leading causes of mortality and morbidity all over the world. Stroke in young, although less common has a much higher impact on public health. These patients are at their most productive years and thus on being disabled, suffer from long lasting social and economic consequences.¹ More often than not they are the sole breadwinners in their family. The age group considered 'young' is different in various studies. The lower limit varies from 0 to 15 years while the upper limit is usually between 40 to 55 years. Majority of the studies and registries have kept it between 15 and 45 years.

Stroke in young needs a different approach to diagnosis and treatment due to the more diverse etiology. Of particular note in young adults are causes such as hematologic disorders, substance abuse, trauma, dissections, oral contraceptive use, pregnancy and postpartum states, and migraine. Pregnancy-related causes of ischemic, hemorrhagic and venous strokes are unique to females in the reproductive age group. Smoking and alcoholism are important risk factors for stroke in young, especially ischemic stroke.

While the general management remains similar, a greater attention on primary prevention is warranted for this age group. Appropriate measures to reduce risk factors will go a long way in reducing the clinical burden of stroke in young.

EPIDEMIOLOGY

In India, the ICMR estimates in 2004 indicated that stroke contributed 41% of deaths and 72% of disability adjusted life years amongst the non-communicable diseases. According to various individual studies, the prevalence rates of stroke increases from 0.1-0.3/1000 in the < 45 year age group to 12-20/1000 in the 75-84 year age group.² About 10-15% of total strokes occur in less than 40 years old.³ Whether young Indians are more susceptible to stroke compared to industrialized countries remains a matter of debate. Several hospital-based studies on stroke in young adults from India had put forward the theory supporting greater incidence of stroke in young in India than developed countries. However, Prasad in a recent article² concluded that Indians in general may probably be more susceptible to stroke but there is no age-specific higher susceptibility for the young. Two recent studies^{4,5} from Kolkata and Mumbai comparing the age-specific incidence between India and other countries show that young adults in India are not more susceptible to stroke than their counterparts in the west. Although Das et al.⁶ have noted that for all age groups together, standardized rate of stroke incidence (123.5/100,000/year) is higher in India than that observed in USA (107/100,000/year), European countries (61-111/100,000/year), and Australia (99/100,000/year) indicating higher incidence of stroke in general among Indians. Overall there is a male preponderance in stroke in young as supported by various studies done in India.^{6,7}

RISK FACTORS AND ETIOLOGY

Like in older adults, stroke in younger adults is also mainly categorized

as ischemic or hemorrhagic. Ischemic stroke is further subdivided into following categories using the TOAST criteria⁸:

- Large-artery atherosclerosis (LAA), including large-artery thrombosis and artery-to-artery embolism;
- Cardio embolism (CE);
- Small artery occlusion (SAO);
- Stroke of other determined cause (OC);
- Stroke of undetermined cause (UND).

While majority of the traditional risk factors that govern stroke in elderly are also found in young adults, certain factors such as smoking, alcoholism, dyslipidemia and increased BMI are strongly associated with stroke in young. Substance abuse, migraine, OCP use and postpartum states are important risk factors specific to this age group. Factors like atrial fibrillation and diabetes mellitus which are important causes in elderly become less important in this age group. A hospital based study from seacoast population of south India evaluated 50 acute ischemic stroke patients irrespective of sex within the age group of 15-45 years.⁹ Majority of the acute ischemic stroke patients were males (76%). Hypertension (56%) was the most common risk factor among acute ischemic stroke in young adults, followed by dyslipidemia (48%), smoking (44%) and alcohol (32%). Similar results were reported by a tertiary hospital study in North India.¹⁰ Identified risk factors for ischemic stroke were hypertension (44.5%), dyslipidemia (26.1%), prior stroke or transient ischemic attack (TIA; 26%), family history of stroke (15.7%), and diabetes (13.9%).

Based on TOAST criteria⁸, in majority of studies, stroke of undetermined etiology seems to be the most common etiology among young stroke patients even after a detailed workup. Stroke of other determined etiology (Table 1) collectively account for 20%-30% of cases of young stroke whereas cardioembolic stroke (Table 2) makes up one third of the cases. Large artery atherosclerosis is an uncommon cause in young accounting for less than 10% cases.¹²

Table 1 Stroke of other determined etiology

| Stroke of other determined etiology |
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| Hypercoagulable disorders – hyperhomocysteinemia, Protein S deficiency, Protein C deficiency, Antithrombin III deficiency |
| Arterial dissection (carotid and vertebral artery dissection) |
| Infectious vasculitis |
| Antiphospholipid antibody syndrome |
| Systemic lupus erythematosus |
| Migraine |
| Takayasu arteritis, Polyarteritis nodosa, Wegener's granulomatosis |
| Fibromuscular dysplasia |
| Acquired hypercoagulable state (eg, cancer, pregnancy, hormonal contraceptive use) |

Table 2 Cardioembolic stroke

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| Cardioembolic stroke |
| Rheumatic heart disease |
| Prosthetic heart valve |
| Cardiomyopathy |
| Atrial Fibrillation |
| Bacterial endocarditis |
| Patent Foramen Ovale |
| Myxoma and other tumors |
| Mitral valve prolapse |
| Acute myocardial infarction |

Rare genetic and hereditary diseases, such as Fabry disease, cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL), and mitochondrial encephalopathy with lactic acidosis and stroke-like episodes (MELAS) must also be considered in the differential diagnosis of young patients with ischemic stroke. Causes of hemorrhagic stroke in young are not different from those in above 45 years. However possibility of cocaine and other substance abuse needs to be kept in mind in a young patient with intracerebral hemorrhage.

DIAGNOSTIC WORKUP

The clinical picture is not unique to this age group. Any young patient in whom stroke is suspected, a detailed history taking and examination should be performed keeping in mind the diverse common and uncommon etiologies. The initial workup should be extensive to allow for early intervention. Brain computed tomography (CT) is usually the first investigation.

Other first line investigations should include complete blood count with differential and platelet count, prothrombin time, INR, activated partial thromboplastin time, blood glucose, serum electrolytes, lipid profile and erythrocyte sedimentation rate. Pregnancy test should be performed in female patients. Other first line imaging studies include chest roentgenogram, electrocardiogram, echocardiography (preferably transesophageal), and duplex scanning of cervicocephalic vessels. A high quality brain magnetic imaging (MRI) and often MRA should be performed wherever possible. Detailed coagulation profile (anticardiolipin antibodies, lupus anticoagulants, protein S, protein C, activated protein C resistance, antithrombin III) and other etiology specific tests must be performed whenever required.

MANAGEMENT

The general management of stroke in young is same as that of stroke in older population. Primary stroke prevention becomes an especially important aspect of stroke in young management. The aim is to reduce the various risk factors. Known vascular risk factors such as hypertension, diabetes mellitus and dyslipidemia are curbed with the help of drugs as well as non drug strategies. The latter includes lifestyle changes including quitting smoking, reducing alcohol consumption, reducing elevated body mass index, regular exercising and adopting a healthy diet with less salt.¹³ A summary of the recent clinical trial data confirms that antihypertensive therapy substantially reduces the risk of any type of stroke, as well as stroke-related death and disability.¹⁴ Diabetes is an uncommon risk factor for stroke in young and though glycemic control decreases microvascular complication, its significance in reduction of occurrence of stroke is not well established.¹⁵ Thus in younger diabetics, greater attention should be given towards controlling blood pressure (130/80) and hyperlipidemia.

Cigarette smoking in young adults is on a rise in developing countries. Programs to spread awareness on the harmful effects of smoking not just in the form of lung disorders, but also in the form of other conditions like stroke, coronary artery disease, peripheral vascular disease, and death from vascular causes are needed.¹² Such measures should also be directed at the young school going population as that is when they are at the most impressionable age.

CONCLUSION

There is an increasing prevalence of stroke in young adults, leaving a major impact on public health. The diverse and unconventional etiology found in this age group makes it difficult to effectively manage them. A comprehensive history taking and clinical examination should be performed. An expeditious investigation should be done so that early intervention can be instituted. Possibility of illicit substance abuse should be kept in mind. Eliciting the history of use of oral contraceptive pills, testing for pregnancy and anti-

phospholipid antibodies is important in young females presenting with stroke. The overall outcome of stroke in young adults is better than that in older individuals. However primary prevention which aims at reducing the risk factors, is of utmost importance.

REFERENCES

1. Putaala J, Mesto AJ, Mesto TM, Konkola N, Haapaniemi E, et al. Analysis of 1008 consecutive patients aged 15 to 49 with first-ever ischemic stroke: The Helsinki young stroke registry. *Stroke* 2009; 40:1195-203
2. Prasad K, Singhal KK. Stroke in young: An Indian perspective. *Neurol India* 2010; 58:343-50
3. Feigin V, Lawes C, Bennet D, Barker Cello S, and Parag V. Worldwide stroke incidence and early case fatality in 56 population based studies: a systematic review. *Lancet Neurology* 2009; 8 (4): 355-369
4. Das SK, Banerjee TK, Biswas A, Roy T, Raut DK, Mukherjee CS, et al. A prospective community based study of stroke in Kolkata, India. *Stroke* 2007; 38:906-10.
5. Dalal PM, Malik S, Bhattacharjee M, Trivedi ND, Vairale J, Bhat P, et al. Population-based stroke survey in Mumbai, India: Incidence and 28-day case fatality. *Neuroepidemiology* 2008; 31:254-61.
6. Nayak SD, Nair M, Radhakrishnan K, Sarma PS. Ischaemic stroke in the young adult: Clinical features, risk factors and outcome. *Natl Med J India* 1997; 10:107-12.
7. Lipska K, Sylaja PN, Sarma PS, Thankappan KR, Kutty VR, Vasan RS, et al. Risk factors for acute ischaemic stroke in young adults in South India. *J Neurol Neurosurg Psychiatry* 2007; 78:959-63.
8. Adams HP Jr, Bendixen BH, Kappelle LJ, Biller J, Love BB, Gordon DL, et al. Classification of subtype of acute ischemic stroke. Definitions for use in a multicenter clinical trial. TOAST. Trial of Org 10172 in Acute Stroke Treatment. *Stroke* 1993, 24(1):35-41
9. Kumar NSS. (2017). Clinical and Etiological Profile of Ischemic Stroke in Young Adults: A Prospective, Observational, Hospital based Study from Seacoast Population of South India. *Austin Journal of Cerebrovascular Disease & Stroke*. 4. 10.26420/austinjcerebrovasdisstroke.2017.1052.
10. Dash D, Bhashin A, Pandit AK, Tripathi M, Bhatia R, Prasad K, et al. Risk Factors and Etiologies of Ischemic Strokes in Young Patients: A Tertiary Hospital Study in North India. *J Stroke*. 2014 Sep; 16(3): 173-177.
11. Kumar HN, Kalra B, Goyal N. A Study on Stroke and its Outcome in Young adults (15-45 Years) from coastal South India. *Indian J Community Med*. 2011 Jan-Mar; 36(1): 62-65.
12. Smajlović D. Strokes in young adults: epidemiology and prevention. *Vasc Health Risk Manag*. 2015; 11: 157-164. Published online 2015 Feb 24. doi: 10.2147/VHRM.S53203
13. Polivka J, Rohan V, Ševčík P, Polivka J Jr. Personalized approach to primary and secondary prevention of ischemic stroke. *EPMA J*. 2014; 5:9.
14. Gaciong Z, Siński M, Lewandowski J. Blood pressure control and primary prevention of stroke: summary of the recent clinical trial data and meta-analyses. *Curr Hypertens Rep*. 2013; 15:559-574
15. Rodriguez-Gutiérrez R, Montori VM. Glycemic control for patients with type 2 diabetes mellitus: our evolving faith in the face of evidence. *Circulation: cardiovascular quality and outcomes*. 2016; 9:504-512.