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Original Article

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A Study of Buccal Mucosa of Smokers to Detect Precancerous Lesions

Daksha Dixit*, T.C. Singel, Shyambabu Rauniyar***, S.M. Bhimalli******

Abstract

Introduction: Oral cancer is one of the 10 most common cancers in the world. Oral habits like smoking, chewing tobacco, gutkha, etc. are documented as initiators of dysplastic changes in the oral mucosa. **Aims:** To study the buccal mucosa of smokers by exfoliative cytology and to assess the cytological and nuclear changes therein. **Objectives:** To study the buccal mucosa of smokers for early detection of precancerous lesions of oral cancer thus helping in better treatment and prognosis. **Materials & Methods:** The study included examination of buccal mucosa followed by scrapping and making smears thereof. The study sample consisted of 100 smokers and 100 controls. The buccal smears thus prepared were stained by Papanicolaous method. The nuclear changes like micronucleation, binucleation, karyorrhexis, karyolysis, pyknosis and condensed chromatin were observed using binocular microscope. **Results:** A significant increase in micronucleation and binucleation of cells was observed in smokers. **Conclusion:** We conclude that tobacco smoking produces cellular alterations in the buccal mucosa. These precancerous lesions can be picked up using exfoliative cytology as early as 10-15 years prior to their malignant transformation. Exfoliative cytology is a non-invasive method which can be used for mass screening of the population for early detection of precancerous lesions of the buccal mucosa.

Keywords: Buccal mucosa; Exfoliative cytology; Smoking; Tobacco; Micronuclei.

Introduction

Cancer is the second most leading cause of mortality in economically developed countries (following heart diseases) and the third most leading cause of death in developing countries (following heart diseases and diarrhoeal diseases).[1] Oral cancer is 1 of the 10 most common cancers in the world. For the year 2008, with estimated incidences of 9.8 cases per 1 lakh population for males and 5.2 cases per 1 lakh population for females, oral cancer is now a major problem in India.[2]

Oral habits like smoking, chewing tobacco, gutkha, etc. are documented as initiators of dysplastic changes in the oral mucosa. Despite numerous advances in treatment taking advantage of most recent protocols for surgery, radiation therapy and chemotherapy, the overall long term survival has remained at less than 50% for the past 50 years.

Tobacco is the most common drug of abuse and is consumed as one of chief source of pleasure by all socio-economic strata in developing countries like India. Tobacco in its many forms (smoking and smokeless tobacco) and alcohol consumption are risk factors for oral cancers and oral mucosal lesions also giving rise to typical cellular changes in oral mucosa.[3,4]

An increased frequency of micronuclei is

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found in smokers and/or tobacco chewers with oral carcinomas.[5,6,7] Hence, micronucleus test, currently known as micronucleus assay has been used for screening populations under risk of mutagenic agents that cause oral neoplasias, especially for the detection of pre-clinical stages of carcinogenic process.

Exfoliative cytology helps in early diagnosis even before the clinical changes occur and is the best method for identifying the precancerous lesions thus remarkably reducing the mortality and morbidity associated with oral squamous cell carcinoma.

Need for the study

Oral lesions constitute major public problem in South Asian countries including India. People in these areas are habitual of taking spicy food, *pan, sopari* (areca nut), smoking and *naswar* (snuff). Prevention and early detection of such potentially malignant disorders have the potential of not only decreasing the incidence, but also in improving the survival of those who develop oral cancer. In view of this, the present study was undertaken to assess the levels of micronuclei in the oral exfoliative cytology of healthy control subjects and the subjects who were in the habit of consuming tobacco in the form of smoking.

Aims & Objectives

To study the buccal mucosa of smokers by exfoliative cytology, and to assess the cytological and nuclear changes therein, for early detection of precancerous lesions of oral cancer, and thus helping in better treatment and prognosis.

Materials & Methods

The present study was carried out, after obtaining clearance from the Institutional Ethical Committee of J. N. Medical College, on 200 individuals (100 smokers and 100 controls). These study subjects were selected from the patients attending at the Out Patient Department at the KLES Dr. Prabhakar Kore Charitable Hospital, Belagavi.

Male subjects aged between 18 and 80 years with a minimum of 3 years of tobacco smoking were included as cases in the study and male subjects having no exposure to tobacco in any form were included as controls.

The socio-demographic history was taken. The subjects having normal appearing buccal mucosa with no dentition and jaw abnormalities were included in the study. After taking an informed consent and explaining the sample collection procedure, the subjects were asked to rinse their mouth with water and the buccal scrappings were taken and smeared on a clean glass slide and were fixed with 100% ethyl alcohol. These smears were later stained by Papanicolaous staining technique using Eosin Azure, Orange Gelb and Harris Haematoxyline without Acetic Acid.

Observations

The slides thus stained and prepared were observed under the binocular microscope. Five areas of evenly spread cells were counted for the total number of normal cells, and the nuclear changes like multinucleation, binucleation, karyorrhexis, karyolysis, pyknosis and condensed chromatin were recorded. These changes were then compared with the smears of the control group. The results were tabulated and relevant graphs were prepared, and statistically analysed.

General Sample Characteristics

Distribution of subjects according to age: The present study was conducted on males ranging between 18 and 80 years. In the study group maximum number i.e. 27 out of 100 were between the age group 31 to 40 years

Table I: Nuclear abnormalities in smokers and control groups

Nuclear Change	Smokers		Controls	
	Present	Absent	Present	Absent
Multinucleation	77	23	20	80
Binucleation	93	07	21	79
Karyorrhexis	28	72	00	100
Karyolysis	37	63	01	99
Pyknosis	40	60	01	99
Condensed chromatin	09	91	00	100

and minimum number i.e. 03 out of 100 were of the age of 18 to 20 years.

Distribution of subjects according to educational status: Out of the 100 subjects, the overall distribution of subjects according to their educational status varied from 1% in people who were illiterate to 46% who had post school education.

Distribution of subjects according to occupational status: In the present study, the smoking habit varied from 10% in Unemployed group to 43% in Farmers.

Distribution of subjects according to socio-economical status: In the study group maximum number i.e. 68 out of 100 belonged to lower middle income group and minimum number i.e. 02 out of 100 were belonging to high income group.

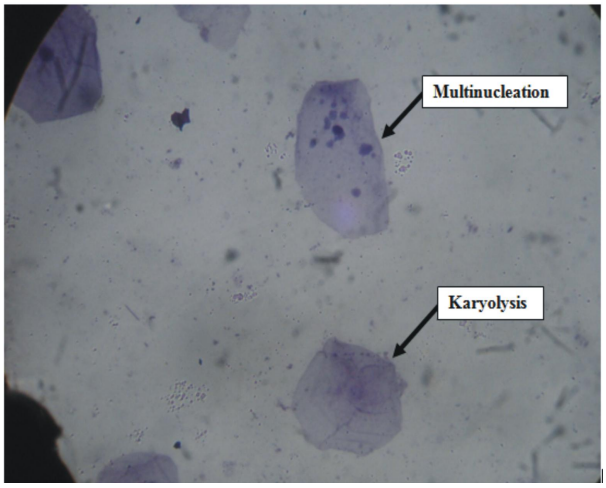
Distribution of subjects according to Total Number of Normal Cells: The total number of normal cells in the 5 areas of evenly spread cells in smokers was 0-50 in 07 cases, 51-100 in 12, 101-150 in 23, 151-200 in 24, 201-250 in 30 and 251-300 in 4 cases. While the total number of normal cells in controls were 101-150 in 3 controls, 151-200 in 13, 201-250 in 33, 251-300 in 23, 301-350 in 9, 351-400 in 12 and 401-450 in 7 controls.

Distribution of subjects according to nuclear changes: The presence was various nuclear abnormalities in smokers and control groups is shown in Table I.

Discussion

Cancer affecting the epithelium of the oral cavity is preceded by lesions that can be clinically detected, among these, leukoplakia is the most frequently occurring type. Use of biomarkers to indicate the potential of precursor lesions to evolve to the process of malignant transformation is a preventive measure that guides therapeutic management. Micronuclei (MN) are distinctively individualized structures within the cytoplasm of interphasic cells measuring between 1/5 and 1/3 of the size of the main nucleus. MN test is especially used for the identification of preclinical stages of the cancer.

Figure I: Multinucleation & Karyolysis



Characteristics of Cellularity

Multinucleation (Figure I)

In the present study, multinucleation was seen in 77% of smokers and 20% of control subjects. On application of statistical test, a highly significant association was observed

Figure II: Binucleation & Karyorrhexis

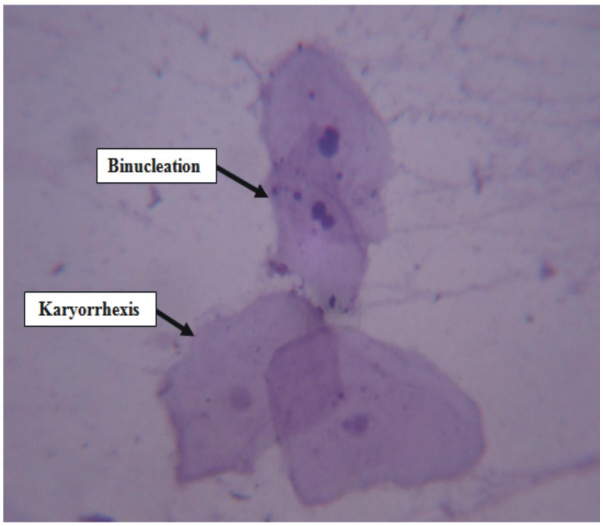
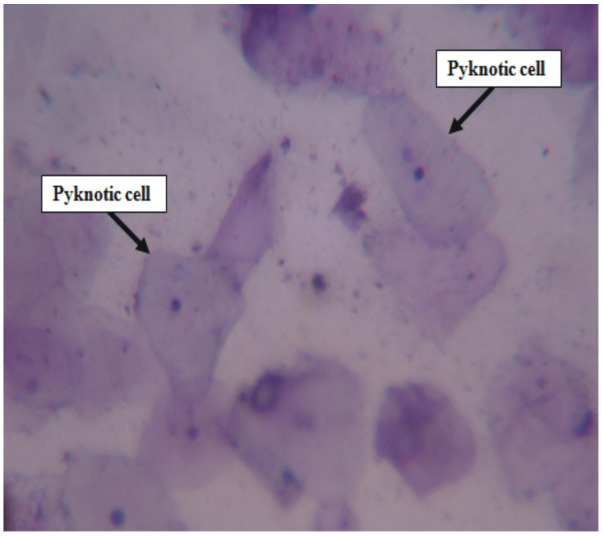


Figure III: Pyknotic cells



between the smoking habit and the presence of multinucleation (p<0.001). Bohrer PL et al in 2005 observed 31 controls, 49 tobacco users, and 27 tobacco and alcohol users in Brazil. Their study revealed a significant association of multinucleation with the use of tobacco and alcohol.[8] Gabriel SB *et al* in 2002 also showed a significant effect .[9]

Binucleation (Figure II)

Our study showed binucleation in 93% of smokers and in 21% of control subjects.This showed a statistically higher association between smoking and binucleation (p<0.001). Rao DN *et al* studied 713 patients at Tata Memorial Hospital from 1980 to 1984 to assess the association between chewing, smoking and alcohol habits, and frequency of binucleation, and reported in 1994 a significant correlation between the two.[10] Binucleation was significantly increased in smokers in the studies done by Tolbert PE *et al* in 1991 and 1992. [7,11]

Karyorrhexis (Figure II)

Our study showed the incidence of karyorrhexis in 28% of smokers, whereas there was no karyorrhexis observed in the control subjects. This showed a highly significant (p<0.001) association between smoking habit and occurrence of karyorrhexis. Similar results were also obtained by the studies done by Tolbert PE *et al* in 1991 and 1992 (North Carolina) that showed incidence of karyorrhexis to be 4.5 times more common in tobacco and alcohol users than in normal cases.[7,11]

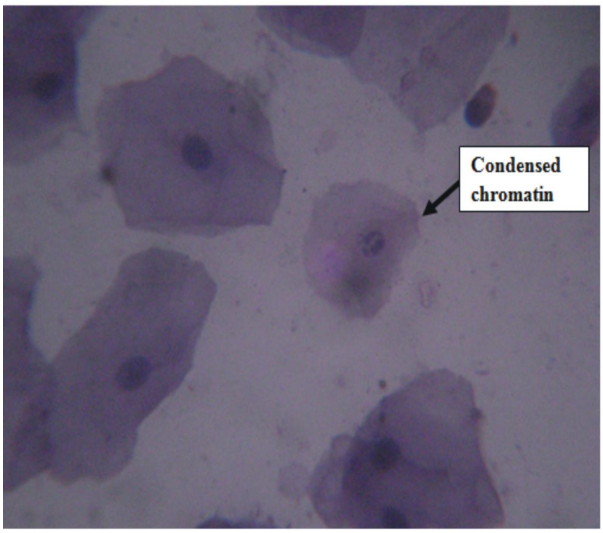
Karyolysis (Figure I)

In the present study, occurrence of karyolysis in smokers was 37% and in controls it was only 1%. It was found to have statistically highly significant (p<0.001) association between occurrence of karyolysis and smoking. The presence of karyolysis in smears from oral cavities has been well documented by Garewal HS et al in 1993.[12] Tolbert PE *et al* in 1991 reported that the incidence of karyolysis was 13 times more common in tobacco users than normal cases. [7]

Pyknosis (Figure III)

Our study showed frequency of pyknosis in 40% of smokers and in only 1% of controls. Statistical test applied on it suggested a highly significant (p<0.001) correlation between incidence of pyknosis and smoking. Chatterjee

Figure IV: Condensed chromatin



S *et al* in 2009 established significant association between tobacco chewing and presence of pyknosis.[13]

Condensed chromatin (Figure IV)

Our study showed presence of condensed chromatin in only 9% of smokers. This did not occur enough to be considered in the statistical analysis.

Resutls

A significant increase in micronucleation, binucleation, karorrhexis, karyolysis and pyknosis of cells was observed in smokers. All these data provide evidence for an increase in frequency of nuclear aberrations in the buccal smear of smokers, and suggest that oral mucosa is susceptible to cancer from tobacco smoking.

Conclusion

We conclude that tobacco smoking produces cellular alterations in the buccal mucosa. These precancerous lesions can be picked up using exfoliative cytology as early as 10-15 years prior to their malignant transformation. Exfoliative cytology is a non-invasive method which can be used for mass screening of the population for early detection of precancerous lesions of the buccal mucosa.

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Original Article

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Study of Congenital Malformations in Central Nervous System in Newborns

Savaskar Shakira V.*, Mundada S., Bhaisare Kiran B.***, Gajbhiye Sonal F.******

Abstract

Introduction: Among all the congenital anomalies, disorders of the CNS are the most severe, difficult to understand its etiology, and predict its clinical presentation and course. 75% of fetal deaths and 40% of deaths within the first year of life are secondary to CNS malformations. **Aims & Objectives:** To study the incidence, pattern and outcome of CNS anomalies in newborns. To established the possible etiological factors and relationship of various antenatal factors. **Materials & Methods:** All babies were examined within 24hrs of birth & followed up to 72hrs, any anomaly detected confirmed by required investigations. **Study Period and design:** January 2012 to June 2013. Cross-sectional study (prevalence study). **Statistical analysis:** Analyzed by simple statistical techniques and tests of significance including Chi-square tests were applied. **Results:** There were total of 10294 newborn of which CNS malformations were 151 patients with 188 anomalies(1.46%). Most frequent CNS malformations was anencephaly 55/188 (29.25%) followed by Hydrocephalus 51/188 (27.13%), spina bifida (19.15%), Meningocele/meningomyelocele (12.77%), encephalocele (3.19%), agenesis of corpus callosum (3.72%). Male were most commonly involved than female (84% v/s 67%). 107/151 (70%) mother did not have preconceptional and antenatal folic acid supplementation. 15/151 (30%) mother had antenatal history of anaemia. Incidence was more in maternal age > 30 years and multiparity. Incidence of congenital anomalies was more in preterm (41.8/ 1000) as compared to full term (10/ 1000). 50 newborns (33.11%) expired within few hrs. **Conclusion:** Maternal age and parity are important risk factor andpreterm and low birth weight babies are at high risk of CNS Malformations.

Keywords: Congenital central nervous system; Malformations; Newborn; Prevention; Prenatal diagnosis.

Introduction

Congenital malformations are a major cause of prenatal and neonatal death, both in developed and developing countries. The field of dysmorphology has expanded dramatically as the number of recognizable patterns of malformations has more than tripled during the last 25 years.[1]

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These malformations have multifactorialetiologies and 40% of cases are idiopathic, but there is an impression that they are more prevalent in populations with consanguineous marriages.[2] Genetic and congenital diseases are almost always serious, incurable, a number of these diseases are treatable, and in some cases, their clinical therapeutic intervention and study of family history and genetic counseling remains of paramount importance.[3]

Congenital malformation will begin to emerge as one of the major childhood health problems. Treatment and rehabilitation of children with congenital malformations is costly and complete recovery is usually impossible. Approximately, 66% of major malformations have no recognized etiology

and most of them have multifactorial inheritance. These defects can occur for many reasons including inherited genetic conditions, poor diet and toxin exposure of the fetus for example to alcohol, birth injury and in many other cases for unknown reasons.[4]

There are several reports that suggest that the incidence, and particularly the pattern, of congenital central nervous system (CNS) anomalies may vary in different geographical locations. However, the extent to which such reported variations are attributable to differences in genetic predisposition, environmental factors or diagnostic precision is uncertain. Studies on the incidence and pattern of different types of congenital abnormalities can provide valuable information for planning health care services, including preventive programs.[5]

The present study is aimed at analyzing the incidence and pattern of congenital CNS malformations and relation to various antenatal factors in the newborns in tertiary health care centre so that future preventive strategies are planned.

Material & Methods

Study was carried out in GMC Latur for a period of 18 months from January 2012 to June 2013. All live newborns and stillborns were included in this study where as all babies born outside, referred to NICU and Abortions (Gestational age <28wks) were excluded from the study.

Data collection was performed in two parts. At first part, variables recorded were about maternal details and included the date of admission, age, gravida, parity, history of chronic illness, drug ingestion, exposure to radiation, history of congenital malformations in other offspring, parental consanguinity, nutritional status of mother, history of smoking, tobacco chewing & alcohol consumption, paternal and maternal occupation were obtained. Certain fatal and placental conditions like APH, placenta previa, hydramnios were noted. The second part was about neonatal details including live or stillbirth, gestational age, birth order, sex, existence of Central nervous system congenital anomaly and type of it, any investigation done. No autopsy examinations were performed. All babies were examined within 24 hrs of birth & followed up upto 72 hrs. The gestational age of baby was assumed from examination of baby and the age previously calculated from Last Menstrual Period was confirmed. Birth weight, sex of each baby was noted and detail physical examination was done. The study cases were investigated by means of X-ray, CT and MRI were done in those cases where diagnosis was inconclusive on clinical examinations. All details were recorded in predesigned patient information sheet after taking written informed consent. Observations were tabulated and analyzed. Statistical analysis was done using Chi-square test.

Observations & Results

Total no. of newborns delivered was 10294 (live births 9861+still births 433) of which 151 (1.46%) newborns had single or multiple CNS malformation (27 still births + 124 live births). I ncidence of CNS anomalies was 14.67 per

Chart 1: Relation of Maternal age with congenital malformations

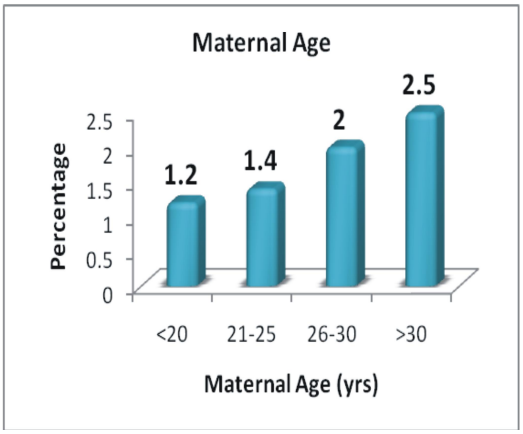


Table 1: Relation of parity with congenital malformations

Parity of mother	No. of cases	Total no. of deliveries	Percentage
1	61	4614	1.3
2	42	3060	1.4
3	33	1699	1.9
4	10	417	2.4
>5	5	200	2.5
Total	443	9990	

Table 2: Correlations of antenatal factors with congenital anomalies

Maternal factors	Percentage
Folic acid supplementation not taken	70
Anaemia	31
Hydromnios	16
Previous abortion	14
Drugs/alcohol/tobacco	12
Fever during first trimester	11.5
Pre-eclamptictoxaemia	10.38

1000 births. Incidence in live birth was 12.57 per 1000; while incidence in still birth was 62.36 per 1000. Only 17 neonates (11.25%) had parental history of consanguinity. Maximum incidence of congenital anomalies were observed in maternal age group >30 years (chart no.)

Highest incidence of anomaly was observed among newborns of > 4 order of birth (Table 1).

High association of congenital anomalies was noticed with lack of folic acid supplementation during antenatal period (Table 2).

51.69% cases had antenatal detection of anomalies on ultrasonography. It is not done in 42.38% cases but 10% cases had normal antenatal ultrasonography. Incidence of congenital anomalies was more in preterm (41.8/1000) as compared to full term (10/1000) as shown in Table 3.

Incidence of anomalies was more in low birth weight new born (<2500gms) as compared to birth weight >2500 gms (Table 4)

Anomalies were more in males 86 (56.8%) as compared to females 65 (43.11%).Pattern of CNS anomalies found in this study were shown in Table 5.

Most frequent CNS malformations was anencephaly (fig 1) 55/188 (29.25%) followed by Hydrocephalus (fig 2) 51/188 (27.13%), spina bifida 36/188 (fig 3) (19.15%), Meningocele/meningomyelocele (fig 4) 24/188 (12.77%), encephalocele (fig 5) 6/188 (3.19%), agenesis of corpus callosum (3.72%), Dandy walker malformations (1%) and others CNS malformations (3.7%).

Out of 151 CNS anomalies, 27 (18%) newborns were still births. Sixty (40%)

Table 3: Relation of CNS malformation with maturity

Gestation	No. of Cases	Total No. of Births	Incidence/1000
Preterm	62 (41.08%)	1482	41.8
Full Term	89 (58.91%)	8812	10
Total	151	10294	

Chi Square Test=267.514 p<0.001, Highly Significant df=1

Table 4: Association of birth weight with congenital anamolies

Birth weight	No. of cases	%
<2500	90	60
>2500	61	40
Total	151	100

Table 5: Showing pattern of CNS Malformations

Pattern	Total pt. 151) *Total anomalies (188)	%	Incidence/ 1000 Live birth
anencephaly	55	36	5.44
Hydrocephalus	51	34	5
spina bifida	36	24	3.3
Meningocele/ meningomyelocele	24	16	2.13
Encephalocele	6	4.0	0.87
Agenesis of corpus callosum	7	4.6	0.3
Dandy walker malformations	2	1.3	0.2
Other**	7	4.6	0.3

*37 patients have multiple CNS anomalies.** other: aqueduct stenosis, semilobarholoprosencephaly, hypoplasticcerebrum, patau syndrome.

Fig 1: Anencephaly

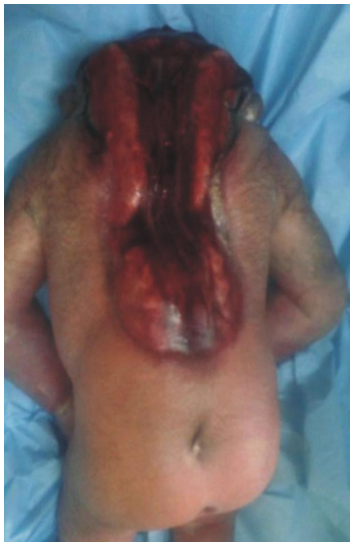


Fig 2: Hydrocephalus with Spinabifida

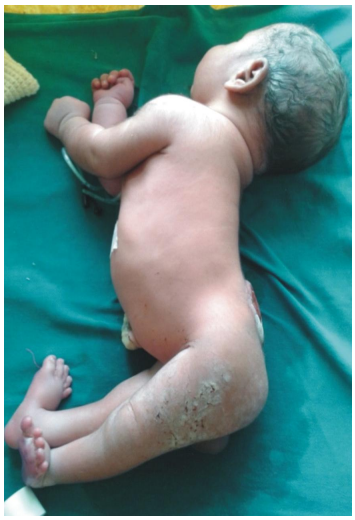


Fig 3: Spinabifida

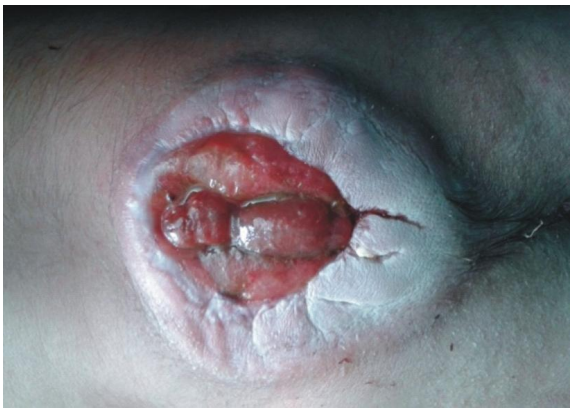


Fig 4: Occipital Meningocele

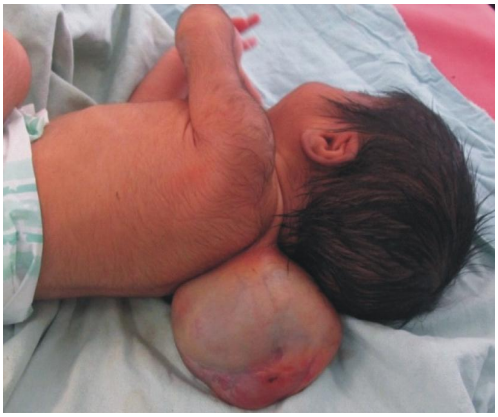
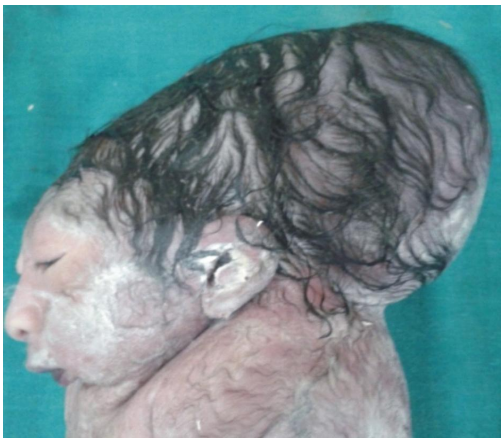


Fig 5: Encephalocele



newborns were expired within 72hrs after birth.(Anencephaly-55, hydrocephalus-2, encephalocele-2, meningocele with multiple anomalies-1). 58 (38%) newborns were referred to different surgical units for correction of anomalies, (Hydrocephalus-27, spinabifida +meningomyelocele-31). Only 6 (4%) newborns were discharged (Agenesis of corpus callosum-4, dandy walker syndrome-1, patau syndrome-1).

Discussion

In present study, the incidence of CNS anomalies was 14.67 per 1000 births Total no. of newborns with CNS anomalies were 151 (1.46%), 27 still births + 124 live births. It is observed that malformations are much more

common in still births 62.36 per 1000 as compared to live births 12.57 per 1000.

Thus, our study found that central nervous system anomalies were the commonest congenital anomalies, which contribute to incidence of 14.96/1000. Our findings are consistent with study of Mital VK *etal[6]* which also showed CNS as the commonest anomaly with incidence of 6.74/1000, Verma M *et al[7]* with incidence of 20.6/1000, Gupta S *et al[8]* with incidence of 6.4/1000.

According to Sayyed SS *et al[9]* CNS malformations were found to be 4.96% and GIT 4.01%. Further it is observed that malformations are much more common in still births (6.53%) as compared to live births (0.63%) similar to this study.

Al-Gazalia, L Sztrihaa, *et al[5]* found that 31 babies had CNS abnormalities giving an incidence of 3.2:1000, The consanguinity level in babies with CNS abnormalities was 62% compared to a consanguinity level of 54% in the general population, but in this study only 17 neonates (11.25%) had parental history of consanguinity. The spectrum of CNS malformations was neural tube defects 49/127 (36.8 % of all CNS malformations), followed by hydrocephalus 34/127 (26.8%). Neural tube defect (NTD) was present in 11 cases (1.14:1000), hydrocephalus in four cases (0.4: 1000) as in our study.

Out of 151 CNS anomalies, 27 (18%) newborns were still births. 60 (40%) newborns were expired within 72 hrs after birth.

Prevention is certainly the best form of therapy. Primary prevention of CNS malformations is limited, with an exception of neural tube defects. Periconceptional folic acid supplementation and/or food fortification with folic acid have reduced significantly both the first occurrence and recurrence of NTDs in the offspring. The consumption of 0.4 mg of folic acid daily is advisable for all women of childbearing age.

There is evidence suggesting that folic acid and other vitamin supplementations prevent neural tube defects and some other form of congenital anomalies. In our studies this may be the risk factor for higher incidence, which requires more extensive study to prove.

Conclusion

- CNS anomalies are one of the most common congenital anomalies with higher incidence of morbidity and mortality.
- Its prevention not only reduces mortality but also morbidity and later handicaps.
- Maternal age and parity are important risk factors.
- Preterm pregnancy and low birth weight babies are at high risk.
- One of the major steps in reducing incidence would be early detection and Medical Termination of Pregnancy.
- Improved antenatal detection & MTP, routine vitamin supplementation specifically folic acid, preconception & for the first 12 weeks of pregnancy should be given emphasis.
- For this, proper antenatal care and high degree of awareness are essential.

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Original Article

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Morphometric Study of Sacral Hiatus in Dry Human Sacra of Maharashtra Region

Joshi Uttama*, Nitin Mudiraj, Dhobale Manisha*****

Abstract

Introduction: The opening present at the lower end of sacral canal is known as sacral hiatus. The anatomy of sacral hiatus and its variations are clinically important during administration of Caudal Epidural Block (CEB) in Obstetrics and Gynaecology (OBGY), Orthopedic, Urology and General surgery practices. The success and reliability of CEB depends upon the sound knowledge of anatomical variations of sacral hiatus. Thus the present study was undertaken to find the variations in dry human sacra of Maharashtra region. **Aim:** To study the morphometry and variations of sacral hiatus. **Methods:** 138 adult, grossly normal dry human sacra of Maharashtrian origin were collected from anatomy department of various medical colleges in Maharashtra. **Results:** Inverted U was the most common observed shape. The most common site of apex and base was observed at S4 i.e. at fourth sacral spine and at the level of S5 i.e. at fifth sacral spine respectively. The length/Height of sacral hiatus most commonly ranged between 11-20 mm (42%). The width of sacral hiatus most commonly ranged between 11-15 mm (53.6%). The Anteroposterior (A-P) Diameter of sacral hiatus most commonly ranged between 3-6 mm (70.3%). **Conclusion:** The knowledge of variations in the shape, level and measurements of sacral hiatus will help in the effective and successful caudal epidural block (CEB) practices which are commonly used in various surgical practices.

Keywords: Morphometry; Sacral hiatus; Caudal epidural block.

Introduction

Sacrum is a large triangular bone, formed by fusion of five sacral vertebrae along with the intervertebral discs. It is present at the base of vertebral column, wedged between the two hip bones forming the posterosuperior wall of pelvic cavity. Sacral canal is formed by sacral vertebral foramina. The sacral canal contains cauda equina, filum terminale, CSF and meninges. The caudal opening of the canal is the sacral hiatus. It is identified in the posterior wall of the sacral canal, due to the failure of fusion of the fifth pair of laminae, exposing the dorsal surface of the fifth sacral vertebral body.[1] The fifth inferior articular processes project caudally and flank the sacral hiatus as sacral cornuae. The filum terminale, the 5th sacral and 1st coccygeal pairs of nerves emerge from the sacral hiatus. It is roofed by the firm elastic membrane, the sacrococcygeal ligament.[2] Anatomical variations occur frequently making the sacrum the most variable portion of spine. Developmental malformations occur ranging from variations in the sacral hiatus to caudal agenesis.[2] Considerable variability occurs in sacral hiatal anatomy among individuals of seemingly similar backgrounds, race and stature.

Sacral approach to epidural space has been utilized for giving anaesthesia and analgesia. Sacral hiatus has been widely used for

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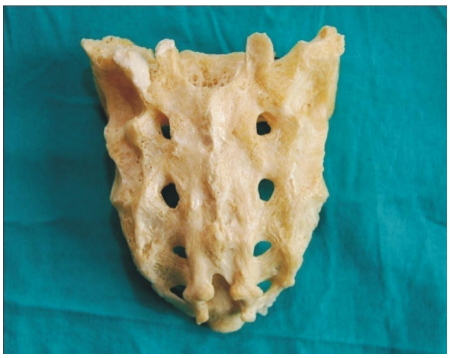
administration of Caudal Epidural Block (CEB) in OBGY and Orthopedic practices for treatment as well as diagnosis. The success and reliability of CEB depends upon anatomical variations of sacral hiatus as observed by many authors.[2,3] The practical problems related to caudal anesthesia are mainly attributable to wide anatomic variations in size, shape, and orientation of the sacral hiatus. Thus the aim of present study is to study the variations of sacral hiatus in Maharashtra region which will be useful during administration of Caudal Epidural Block (CEB).

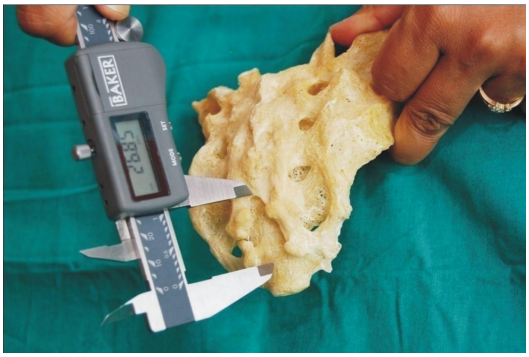
Materials and Methods

The present Morphometric study was done on 138 adult, grossly normal dry human sacra of Maharashtrian origin, collected from anatomy department of various medical colleges in Maharashtra.

Photograph 1: Showing U shaped sacral hiatus



Photograph 2: Showing measurement of length in V shaped sacral hiatus



Photograph 3: Showing agenesis of sacral canal

Two Sacra were excluded from the measurements as typical sacral hiatus was not present in them and showed complete agenesis of the dorsal bony wall. The measurements were recorded by digital Vernier caliper accurate to 0.1 mm.

1. Shape of hiatus
2. Level of apex of hiatus in relation to sacral vertebra.
3. Level of base of hiatus in relation to sacral vertebra.
4. Length of Sacral Hiatus.
5. Width (Intercornual Distance) of Sacral Hiatus.
6. Antero-posterior (A- P) Diameter of Sacral Hiatus.

Results

Parameters were studied and analysis was done. The analyzed data was tabulated as follows:

Table 1: Shows shape of Sacral Hiatus

Shape	No	P (%)
H	1	0.7
Inverted U	69	49.6
Inverted V	59	42.4
W	10	7.2
Total	138	100

Table 2: Shows Level of Apex and Base of Sacral Hiatus

Vertebral level	Level of apex		Level of base	
	No	P (%)	No	P (%)
S 2	02	1.4	0	0
S 3	32	23.2	1	0.7
S 4	88	63.8	3	2.2
S 5	16	11.5	134	97.1
Total	138	100	138	100

Table 3: Shows Length of Sacral Hiatus

Length of Hiatus	No	P (%)
0 – 10 mm	4	2.9
11– 20 mm	58	42.0
21 – 30 mm	48	34.8
31 – 40 mm	18	13.0
41 – 50 mm	8	5.8
> = 50 mm	2	1.4
Total	138	100.0

Inverted U and V were most common observed shapes. 'U' was found in 69 (49.6%) and 'V' was found in 59 (42.4%).

The most common site of apex was observed at S4 i.e. at fourth sacral spine in 88 sacra (63.8%) where as base of hiatus was most commonly present at the level of S5 i.e. at fifth sacral spine in 134 sacra (97.1%).

The length / Height of sacral hiatus most commonly ranged between 11-20 mm.

The width of sacral hiatus most commonly ranged between 11-15 mm.

The Anteroposterior (A-P) Diameter of sacral hiatus most commonly ranged between 4-6 mm.

Table 4: Shows Width (Intercornual Distance) of Sacral Hiatus

Width of Hiatus	No	P (%)
5 – 10 mm	2	1.4
11 – 15 mm	74	53.6
= 15 mm	62	44.9
Total	138	100.0

Table 5: Shows Anteroposterior (A-P) Diameter of Sacral Hiatus

A-P Diameter	No	P(%)
0 – 3 mm	11	8.0
4 – 6 mm	97	70.3
7 – 9 mm	27	19.6
= 9 mm	3	2.2
Total	138	100

Discussion

Caudal epidural block (CEB) is a procedure which involves injection of a drug into the epidural space through the sacral hiatus for anaesthesia. Study on the anatomical variations of the sacral hiatus and the dorsal wall of sacral canal are related to successful caudal epidural block. Caudal epidural block (CEB) has 25 % failure rate.[4]

In the present study, 2 Sacra were excluded from the measurements as typical sacral hiatus was not present in them and showed complete agenesis of the dorsal bony wall.

Shape

In the present study the shapes of sacral hiatus were variable and were found to be predominantly of either inverted 'U' (49.6%) or inverted 'V' (42.4%). The most common shape of sacral hiatus was inverted 'U' in 69 (%) and findings were similar to Nagar and Seema.[5,7] Vinod Kumar[6] also noted various shapes, most common being inverted 'V' (46.53 %).

Apex of hiatus

The level of apex of the sacral hiatus was most commonly seen at S4 in 88 sacra (63.8%), which was similar to Sekiguchi M and Nagar (65 %)[2,5] and other researchers. All studies including the present study noted that the location of apex can vary from upper part of S3 sacral vertebra to S5 vertebra. The knowledge of distance from the apex of sacral hiatus to the lower lumbar spinous process is important to develop the technique to prevent

Table 6 & 7: Shows Comparison between the findings of different Authors

Author	Year	Shape %	Level of apex%	Level of base%
Nagar	2004	U (41.51 %)	S4 (55.9 %)	S5 (72.6 %)
Dipali Rani pal	2012	U (40 %)	S4 (50 %)	S5 (82.5 %)
Vijisha	2013	U & V (35%)	S4 &S5 (46%)	--------
Seema	2013	U (42.95%)	S4 (56.36%)	S5 (70.46 %)
Present study	2014	U (49.6 %)	S4 (63.8 %)	S5 (97.1%)

Table 7

Author	Year	Length of hiatus %	Width of hiatus %	A-P dia.of hiatus %
Nagar	2004	11-20mm	10-15mm	4-6 mm
Dipali Rani Pal	2012	21-30mm (46.3 %)	11-15 mm (56.2%)	4-6mm (75 %)
Vijisha	2013	10-20 mm (60%)	11-20 mm (92%)	4-6 mm (57%)
Seema	2013	11-20 mm (52%)	11-15 mm (51.67%)	4-6 mm (71.81 %)
Present study	2014	11-20 mm (42 %)	11-15mm (53.6 %)	3-6 mm (70.3%)

the neurological injuries associated with the neuraxial injections.[11]

Base of hiatus

In the present study the level of base of the sacral hiatus was most commonly seen at S5 in 134 sacra (97.1%). The findings were similar to previous researchers like Nagar, Seema[5, 7].

Length of Sacral Hiatus

The length of sacral hiatus ranged between 8.14- 57.78 mm, with a mean of 22.8mm. The most common length was found between 11–20 mm in 58 sacra (42%). This wide variation in the length is because of the wide variation in the location of apex and base of hiatus. Similar results were noted by Nagar, Seema and Vijisha. [5,7,8]. Study by Dipali showed the common range between 21-30 mm (46.3%).

Width (Intercornual distance) of hiatus

The width of sacral hiatus ranged between 4.51-20.53 mm, with a mean of 14.47mm. The most common width between 11-15 mm was found in more than half i.e. in 74 sacra (53.6%).Similar results were noted by Seema, Vijisha and Dipali.[7,8,9]

Anteroposterior diameter at the apex

A bony septum in the sacral hiatus, hiatal agenesis or complete agenesis (spina bifida) cause failure of CEB. The diameter of sacral canal less than 2 mm can impedes the use of 22 G needles for CEB.[4] The anteroposterior diameter at the apex of sacral hiatus is important as it should be sufficiently large to admit the needle [10]. In the present study, anteroposterior diameter ranged from 0.73 to 9.37 mm, with a mean of 4.84 mm. The diameter of canal was predominantly between 4-6 mm in 97 sacra (70.3 %). Hiatal agenesis was observed in 2 sacra (1.4 %). These findings were similar to that of Seema and Dipali.[7,9]

Conclusion

For caudal epidural block (CEB) to be successful identification of sacral hiatus is

mandatory. Variations in the shape and level of hiatus may lead to failure of CEB. The sacral hiatus has anatomical variations and knowledge of these variations may improve the success of caudal epidural block (CEB). Hence detailed knowledge of sacral hiatus with its variations and its surrounding anatomy is essential.

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Original Article

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Morphological Anatomy of Splenic Artery and its Clinical Implications

Bhivate Varsha R.*, Kharate Rahul P., Ujjawal Narpatsingh***, Gaikwad Jyoti R.******

Abstract

Context: To study morphological Anatomy of splenic artery and its clinical implications. **Aims**: The present study reports; origin, course, distance of division from the hilum of spleen and branching pattern of splenic artery. **Setting and design**: Department of Anatomy MGM medical college, navimumbai. **Material and method**: The measurements were taken on 50 donated embalmed cadavers. The findings were noted after meticulous dissection. **Results**: The origin of splenic artery is from splenic artery in all cases. In relation to pancreas the splenic artery had suprapancreatic course in 74%followed by anteropancreatic in 18%, intrapancreatic in 6% and retropancreatic in 2%.In two cadavers the stem of the artery divided into two or three branches which has either suprapancreatic or anteropancreatic course. The splenic trunk divided into two primary branches in 84% and three primary branches 16%.Superior polar artery was present in 28%, inferior polar artery was present in 42%and in 12% both superior and inferior polar arteries were seen. The mean distance of the point of division of splenic artery from the hilum was 4.308 cm and minimum was 3.1 cm. It is found that primary branches and polar branches of splenic artery divide the spleen into segments. In our study the segmental branches were 2 in 84% and 3 in 16%. **Conclusion**: Knowledge of splenic artery has the clinical significance in planning and conducting procedures such as partial or total splenectomy, splenic embolisation, splenography and surgical and radiological procedures of upper abdominal region to avoid any complications.

Keywords: Splenic artery; Branching pattern; Hilum; Course; Splenectomy.

Introduction

Variations of origin and course of arteries of different organs are not only of anatomical and embryological interest but also of practical and clinical importance when these variations can be the agents of pathological conditions or in surgery when knowledge of them can result in more accurate treatment.[1]

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Surgery of the organs of the supracolic part of the abdomen requires a thorough knowledge of the vascular anatomy of this region. The vascular anomalies are due to the aberration in the embryological development. Embroylogically the splenic artery is one of the branches of the artery of foregut, i.e. celiac trunk. It passes horizontally to the left, behind the stomach, along the upper border of the pancreas. Near the tail of the pancreas it enters in the lienorenal ligament and then divides into five or more terminal branches that enter the hilum of the spleen and spleen is supplied exclusively by splenic artery.[2]

The present study reports origin, course, distance of division of splenic artery from the hilum of spleen and branching pattern of the splenic artery.

Materials and Methods

The present study was conducted in Dept of Anatomy MGM Medical College, Kamothe, Navi Mumbai .The study was conducted on 50 embalmed donated cadavers. The study technique consisted of meticulous dissection, observations and measurement of various parameters.

In each cadaver, an incision was made in the midline from xiphoid process till the umbilicus and extended it till pubic symphysis encircling the umbilicus. A curved incision was made from anterior superior illiac spine to public symphysis. Skinflaps and superficial fascia were reflected by blunt dissection according to Cunnigham.[3] The external oblique, internal oblique and transverous abdominis muscles were reflected. The rectus sheath, fascia transverslis and peritoneum were divided. Celiac trunk exposed. The tail of pancreas and lineorenal ligament identified and terminal branches of the splenic artery dissected and counted.

The origin and course of splenic artery dissected along with pancreas. Distance between point of divisions of splenic artery and splenic hilum was measured by using measuring tape and thread. Its variations about origin, course, distance from division and branches were observed and noted down. Any of the variations in the term of numbers of segmental branches if present noted.

The present study deals with the variations of only branches of splenic artery that enter spleen. The pancreatic branches, short gastric branches of splenic artery were not taken into consideration. The photographs of the study and if any variation found, were taken. All these data were tabulated and subjected to appropriate statistical test.

Graph 1: Histogram showing distribution of splenic artery in relation to pancreas along with confidence interval

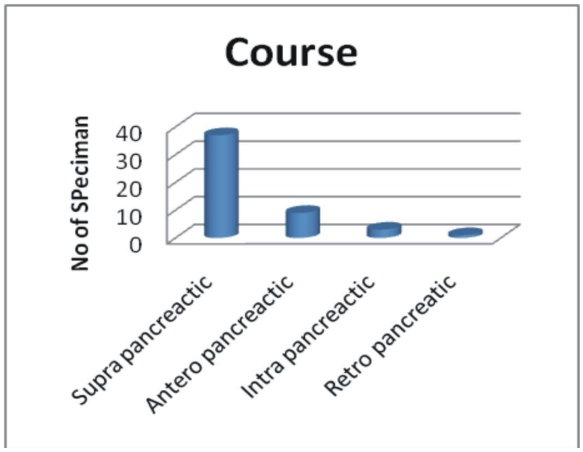


Figure 1: Suprapancreatic course of splenic artery and Inferior polar branch arising from left gastroepiploic artery.(SA-splenic artery,PB-primary branches,LP-lower polar branch,LGEA-left gastroepiploic artery)

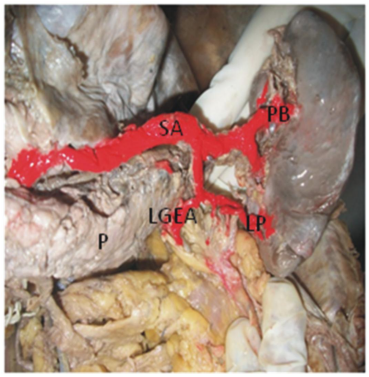
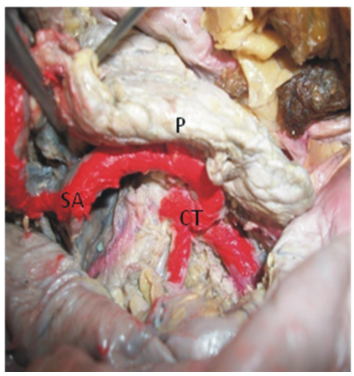
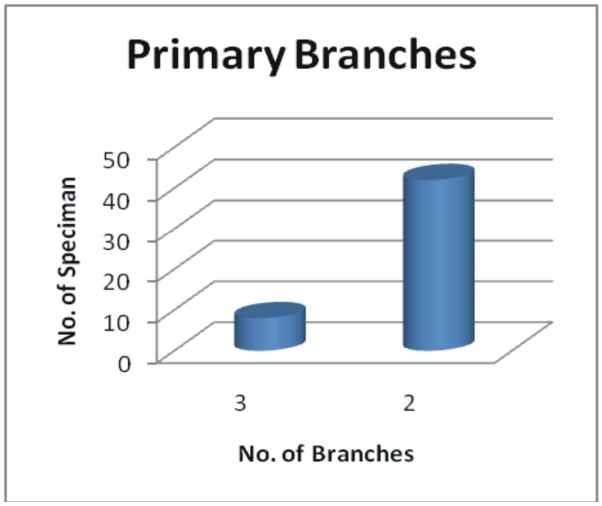


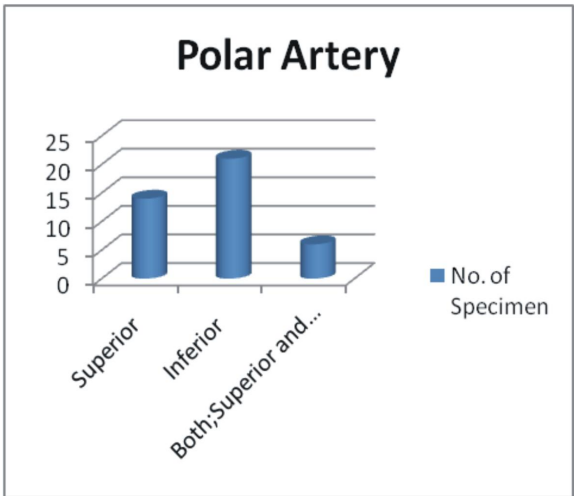
Figure 2: Retropancreatic course of splenic artery and origin from celiac trunk. (P-pancreas, SA-splenic artery, CT-celiac trunk)



Graph 2: Histogram showing primary branches of splenic artery.



Graph 3: Histogram showing distribution of polar artery



Results

The origin, course, distance of division from hilum and branching pattern of splenic artery were studied in 50 human cadavers. Out of 50 cadavers, the splenic artery originated from celiac trunk in all 50 cadavers (figure 2).In relation to pancreas the splenic artery had suprapancreatic course in 37 cadavers (figure 1) followed by anteropancreatic in 9, intrapancreatic in 3 and retropancreatic (figure 2) in1 cadaver (graph 1). In two cadavers the stem of the artery divided into two or three branches which has either suprapancreatic or anteropancreatic course. Such an aberrant course makes the artery vulnerable to iatrogenic injury during intervention of pancreas.The splenic trunk divided into two primary branches in 42 cadavers and three primary branches (figure3) in 8 cadavers (graph 2). In the present study, polar arteries were also found (figure 4). In 14 [28%] spleens, superior polar artery was present whereas in 21 [42%] spleens, inferior polar artery was present (figure 1) and in 6[12%] both; superior and inferior polar

Figure 3: Splenic artery and 3 primary branches. (S-spleen, PB-primary branches, SA-splenic artery)

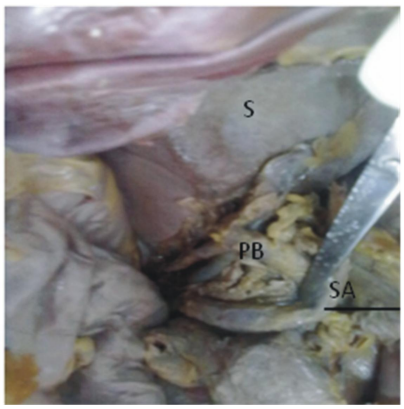
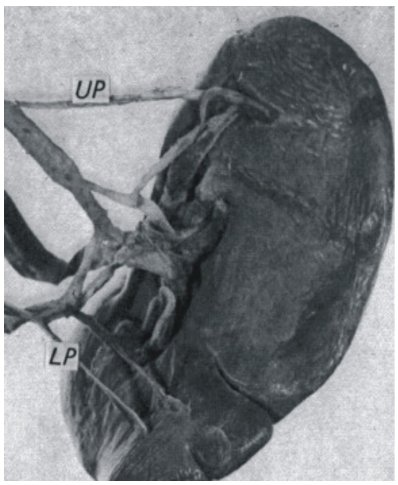
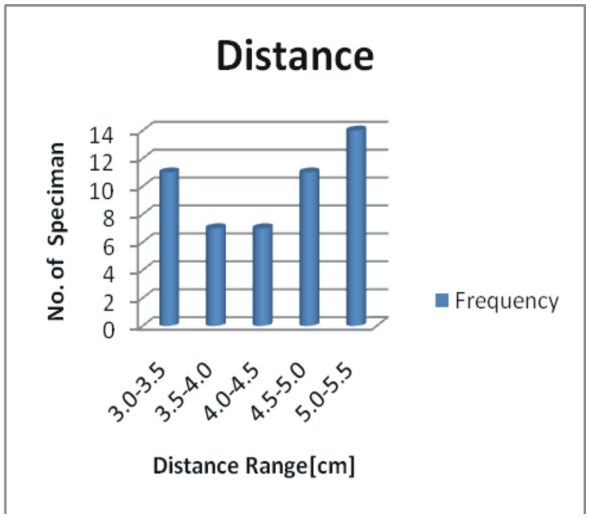


Figure 4: Showing upper and lower polar branches. (UP-upper pole branch ,LP-lower pole branch)



Graph 4: Histogram showing distance of division from the hilum



arteries were seen (graph 3).The segmental branches divided in too many generations but did not show any anastomosis , so they were described as end arteries.The mean distance of the point of division of splenic artery from the hilum was 4.308 cm and minimum was 3.1 cm (table1). It is found that primary branches and polar branches of splenic artery divide the spleen into segments. These segments are separated by avascular planes by segmental branches. In our study the segmental branches were 2 in 84% and 3 in 16%.

Discussion

In the current study, splenic artery was arising from celiac trunk in all cases (100%). This finding was comparable to the study of Vandamme JP and Bonte J who observed that celiac trunk composed of 3 main stems splenic, hepatic and left gastric. The variation of the origin of splenic artery was exceptional.[4] Also this finding was in agreement with other studies done by Jauregui E, Moore and Delly, Y. Mikhal, R Kamel, N.N. Nawan and M.F.M Rafela who showed that the splenic artery originated from celiac trunk in all cases.[5,6] Also in 2011, Ambica Wadhawa and Sandeep Soni found that in 94% of cases they studied, celiac artery was a common trunk of origin for the 3 branches. In 6% cases left gastric origin was different.[1] This finding of the splenic artery was similar to our study.

Many earlier reports by Lipshutz in 1917, Hollinshed and Ross in 1985, Sponza *et al* in 1993, Vatnaki *et al* in 1995, Slaba *et al* in 1998 showed that if the splenic artery not arising from the celiac trunk, then it had an aberrant origin either from aorta, superior mesenteric or left gastric arteries.[2] But these findings were not observed in our study.

The course of splenic artery followed the superior border of pancreas according to William *et al* (1995). Study done by Redmond *et al* showed that the splenic artery follows the suprapancreatic course in majority of cases but in few cases it has either retro or intrapancreatic course.[7] In 2004, S. K. Pandey, V. K. Shukla showed that suprapancreatic course was commonly observed, followed by anteropancreatic, intrapancreatic and retropancreatic course. These findings were similar to our study.[2]

In the present study it is found that the artery follows the superior border of the sretropancreatic or intrapancreatic course. The variation in the course of the artery in relation to the pancreas might be due to the abnormal fusion of the ventral and dorsal bud as reported earlier (Ozan and Onderglu 1997).[2]

We further observed that in two cadavers the stem of the artery divided into two or three branches which had either suprapancreatic or anteropancreatic course. Such an aberrant course makes the artery vulnerable to iatrogenic injury during intervention of

Table 1: Showing distance of division from the hilum

Distance of division	Minimum	Maximum	Mean	Standard Deviation	Variance
	3.1	5.9	4.368	1.03123	1.063

pancreas.

In Aug 2001, Muzaffer Sindel, Levent Sarikcioglu, Kagan Ceken, Satm Yilmaz had measured the distance between the origin of the last pancreatic branch and the splenic hilum in digital angiogram and cadaver specimen. In anatomical measurement it was 3.9±0.78 cm and angiographically it was 3.75 ± 0.68 cm. Similarly in our study the distance between the point of division of splenic artery into primary branches and the hilum was 4.368 cm. In 50 specimens, maximum distance was 5.90 cm, minimum distance was 3.10cm, deviation was 1.0312 and variance was 1.063. Mean distance from the hilum was 4.3680 cm which was slightly greater than the above study.[8] The point of division of splenic artery was not constant, being quite close to the hilus or several centimeters from it, as previously reported by Piquand, Volkman and Gupta.[9] In 1999, Jauregui E, showed that the distance between the extremity of pancreas and the splenic hilum was 2.2 cm with final ranging from 0 to 4 cm.[5]

Y. Mikhial, R Kamel, N. N. Y. Nawar and M.M.M. Rafela found that 2/3rd of the cases splenic artery was divided into two terminal branches. Lipshutz also found that the splenic artery divided into two terminal branches in 72% and three terminal branches in 28%. These two studies were similar to our study in which we found that splenic artery was divided into three primary branches in 16% and two primary branches in 84%.[6]

In 1999, Jauregui E and in 1989 Redmond H P found that in 100% cases splenic artery divided into two primary branches which was similar to our study whereas S. K. Pande , S. Bhattacharya, R. N. Mishra, V. K. Shukla (2003) showed that two terminal braches were most common followed by 4, 6 and more than that. These finding were not similar to our study.[5,6]

C. D. Gupta, S. C. Gupta, A. K. Arora and P. Jeyasingh in their corrosion case study prevailed that the splenic segment formed by 2 primary branches in 84% and three in 60%. These segments were separated by avascular planes lying perpendicular to long axis of the spleen. Each primary branch was found to supply a definite segment of spleen with only slight overlapping and without an apparent anastomosis between the vessels of adjacent segments. These finding were similar to our study.[9]

According to Y. Mikhail, R, Kamel, N. N. Nawar and M. F. M. Rafela, avascular planes between the segments coinciding with the deep notches on the external faces of spleen separated by the territories were supplied by these splenic arteries. Such planes divided the spleen in two lobes. The splenic lobes could be 2-5 in number. The additional lobes were found when polar arteries were present. They showed that in 12% of spleens there were both upper polar and lower polar arteries, in another 12% only upper polar arteries were present and in 50% presented with lower polar arteries. In our study we found that in 28% upper polar, in 42% lower polar and in 12% cases both upper and lower polar was present. Knowledge of variations of splenic artery is of extreme clinical importance while performing Appleby procedure that is total pancreatectomy in case of carcinoma of pancreas body and tail. Surgeons must have a knowledge regarding branching pattern of splenic artery or else there is a possibility of dangerous bleeding if damaged. [10] With the development of techniques of arteriography, the knowledge of arteries and of their variations has acquired a special importance for correct interpretation of the different and sometimes very complicated pictures.[1]

Conclusion

From the present study we conclude that,

- Splenic artery follows the suprapancreatic course in majority of cases (74%), but anteropancreatic in

18%, intrapancreatic 46% and retropancreatic 2%. In two cadavers the stem of the artery divided into two or three branches which has either suprapancreatic or anteropancreatic course. Such an aberrant course makes the artery vulnerable to iatrogenic injury during intervention of pancreas.

- We found that the superior polar branch was slender and thin could be easily damaged. To avoid these surgeries on the spleen should be done from the inferior pole.
- To achieve safe splenic embolisation and avoid the risk of pancreatitis, the embolic material should be delivered through the catheter at a distance of 3.1 cm from the hilum.
- It is found that primary branches and polar branches of splenic artery divide the spleen into segments. These segments are separated by avascular planes by segmental branches. In our study the segmental branches were 2 in 84% and 3 in 16%. The segmental branches divided in too many generations but did not show any anastomosis, so they were described as end arteries. This enables partial splenectomy.
- Spleen is exclusively supplied by splenic artery.[11] The segmental blood supply makes segmental resection possible thus could be important where preservation of splenic tissue is necessary.[12]
- Knowledge of variations concerning the CT is of extreme clinical importance in the areas of the Appleby procedure, laparoscopic surgery, and radiological procedures in the upper abdomen, and should be kept in mind by clinicians to avoid complications.[13]
- The anatomical variations of the splenic artery make it vulnerable to iatrogenic injury (Waizer *et al*, 1989). Knowledge of the existing aberrations is important in planning and conducting surgical procedure. (Oran *et al*, 2001).[2]

Acknowledgement

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Case Report

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Anomalous Origin of Sural Nerve: A Case Report

V.B. Bhagwat*, Y.K. Karnewar, D.S. Joshi***, A.K. Prasad****, S.S. Dhapate*****

Abstract

Sural nerve normally receives contributions from tibial nerve and common peroneal nerve. In the routine cadaveric educational dissection, sural nerve was seen to be arising from the common peroneal nerve instead of the tibial nerve on both sides. It was arising directly from the common peroneal nerve about 6 cm below the division of the sciatic nerve on right side and 8 cm below the division on left side. But in its rest of the course, it showed a normal branching pattern.

Keywords: Anomaly; Sural nerve; Common Peroneal nerve.

Introduction

The normal structures as well as the variations in the structures of the human body are the areas of great interest especially for the anatomists, physicians and surgeons. Variations of different structures in the extremities are fairly uncommon, but if present, are of great importance for the surgeons to operate or to undertake various surgical procedures related to these structures. Normally sural nerve is formed by contributions from both the tibial nerve (TN-L4, L5, S1,S2, S3) and the common peroneal nerve (CPN-L4,L5,S1,S2) in lower extremity. The branch from the Tibial Nerve, which is often more substantial, is called the medial sural cutaneous nerve (MSCN). The branch from the Common Peroneal Nerve is termed the peroneal communicating branch (PCN).[1] Site of origin of Sural Nerve is highly variable. Most commonly it is formed in middle third of calf of leg. It descends lateral to tendocalcaneus. It proceeds along lateral border of foot.[2] Sural nerve is an entirely cutaneous nerve, except for some unmyelinated autonomic fibers. As it is a sensory nerve, its injury produces trivial sensory deficit. It is used for nerve biopsy.[2] As per Santanu Bhattacharya et al the, Sural Nerve formation is variable in both limbs.[3]

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Case Report

In the routine cadaveric educational dissection at the department of Anatomy, SRTR GMC, Ambajogai, a rare variation was detected in the formation of sural nerve in both the lower limbs of a 62 years old male cadaver. In present case Sural nerve showing considerable amount of variation in its origin, course & distribution as well as its relation with other structures.In this case, Sural nerve was arising entirely from common peroneal nerve (L4, L5, S1,S2) in both the limbs, with no contribution from the tibial nerve. It was arising directly from the common peroneal nerve, about 6 cm below the division of the sciatic nerve on right side and 8 cm below the division on left side. It then descended lateral to tendocalcaneus, lying close to small

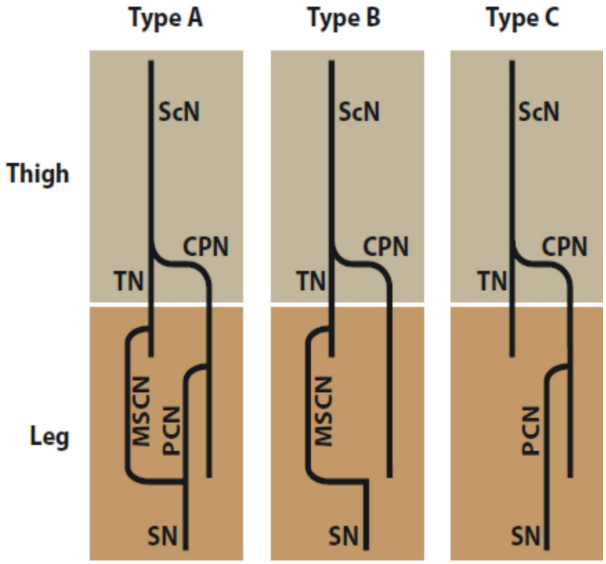
Dissected Right Limb

Dissected Left Limb

saphenous vein, between lateral malleolus and tendocalcaneus. In our case the Sural Nerve was formed little above the middle of the popliteal fossa on both the sides. Then it proceeded along lateral border of foot. The nerve was supplying skin of the posterior lateral corner of the leg, and the lateral foot and 5th toe. And in its further course, it showed a normal branching pattern and normal cutaneous distribution.

Abbreviations:

- T-Tibial nerve
- C-Common Peroneal Nerve
- S-Sural nerve
- Sc-Sciatic nerve



Discussion

The pattern of formation of the Sural Nerve has been broadly divided into three types A, B and C by Huelke depending on contribution from tibial nerve and common peroneal nerve.[4]

Type A - anastomotic type, Type B – nonastomotic type, Type C - nonastomotic type

Abbreviations

CPN – Common peroneal nerve, TN- Tibial nerve, ScN-Sciatic nerve, MSCN- Medial sural cutaneous nerve, PCN- Peroneal communicating nerve, SN-Sural nerve

Other nerves that also contribute are- Lateral cutaneous nerve of the calf, the posterior cutaneous nerve of the thigh In the present case, type C was seen on both sides. Types A and B are much more common as compared to type C. The incidence of type C varies from 0% to 14% in various studies conducted throughout the world like USA, Japan, and Korea. These differences may be due to genetic variations in different races, wide variation in the sample size of the studies that have been conducted. No large studies have been conducted in Indian populations so far. The type A pattern of formation is most often bilaterally present in about 67% cases.[5] Type C pattern is commonly unilateral and is usually combined with another pattern on the opposite side.

According to some authors, CFN gives rise to two cutaneous branches, often from a common trunk –they are lateral sural nerve and sural communicating nerve (SCN). According to some authors, SCN is also called LSCN.[6,7] As per Pyon S B et al, Sural nerve was a direct continuation of the MSCN in four (15.4%) cases, and there was no communication between the MSCN and LSCN in two cases (7.7%).[8,9] The MSCN, which arises from TN, did not involve in the formation of SN [10] The point of joining of the Medial

Sural Cutaneous Nerve and the Peroneal Communicating Nerve to form the Sural Nerve is highly variable. The most common site of formation appears to be the middle third of the calf.[2] Various studies, have revealed that the site of formation of the Sural Nerve in the upper fourth of the leg occurs in between 3 to 24.3% of cases.[11] In our case the Sural Nerve was formed little above the middle of the popliteal fossa on both the sides.

The relative contributions of the Medial Sural Cutaneous Nerve and the Peroneal Communicating Nerve have been studied in livings subjects using nerve conduction methods.[7] The contribution from the Medial Sural Cutaneous Nerve is usually larger as compared to the Peroneal Communicating Nerve.

Conclusion

We report a rare case of bilateral variation in the origin of sural nerve, which arise as a branch from common peroneal nerve and did not receive any contribution from medial sural cutaneous nerve, a branch of tibial nerve. The peroneal communicating branch can be of substantial caliber and may be useful as a source of nerve graft without complete sacrifice of the sural nerve.[12] This finding is of great significance. Since sural nerve is widely used in biopsy and as autograft in peripheral nerve transplantation, as well as in other procedures, awareness about variation in the formation and course of nerve has immense value to the clinicians.[7] Clinically, SN is used in sensory nerve grafting for therapeutic purposes because of its long course; it is also used in nerve conduction velocity studies for diagnostic purpose.[11]

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Case Report

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Bilateral Abnormal Origin of Radial Artery From 3rd Part of Axillary Artery: A Case Report

M.B. Saknure*, M.P. Parchand, C.A. Satpule***, S.A. Talokar****, A.M. Wahane*******

Abstract

The present case report shows the variation of the radial artery in its origin and superficial course, during routine dissection in the Dept. of Anatomy of Indira Gandhi Govt. Medical College Nagpur.

A higher bifurcation of 3rd part of Axillary artery into radial artery and brachioulnarartery is being reported in right and left side of upper limb of a female cadaver. This radial artery is superficial through out in its course. It is continued as radial artery and another artery remain as main trunk of brachioulnarartery & descend down wards in forearm as ulnar artery. Incidence of this type of vascular pattern can be a result of developmental anomaly during the formation of blood vessels of the upper limb. This variation has diagnostic, interventional and surgical significance.

Keywords: Abnormal radial artery; Axillary artery variation; Superficial brachioradial artery.

Introduction

Variations in the arterial pattern of upper limb are common and have been reported by several investigators.[1]

Axillary artery is the direct continuations of the subclavian artery at the outer border of the 1st rib.

The course of the axillary artery is the anatomically divided into 3 parts by the pectoralis minor muscle into 3 parts.[2]

Out of this 3rd part gives subscapular artery, anterior and posterior circumflex humeral artery.[3]

Radial artery is smaller terminal branch of branchial artery and begins in the cubitalfossa about 1 cm. below the bend of elbow at the level of the neck of radius.

Brachial artery is continuation of axillary artery. In the hand branches of radial artery and ulnar artery contribute to the formation of superficial palmar arch.[4]

Case Report

During routine under graduate dissection of a female embalmed cadaver in the Dept. of Anatomy, at Indira Gandhi Government Medical College, Nagpur.

An anomalous branch arising from the 3rd part of the axillary artery proximal to the union of the two roots of the median nerve was observed in both side of upper limb. It passes between the two roots of the median nerve on the both side. It then crossed from medial to the lateral of the arm superficial to biceps brachii muscle. Radial artery did not give any branch in the arm. In the cubital fossa it anastomoses with brachial artery via a communicating branch. In the forearm its course was similar to the radial artery and it descend superficially in the lateral part of the forearm and entered into the anatomical snuff box. Finally it terminates by forming a deep

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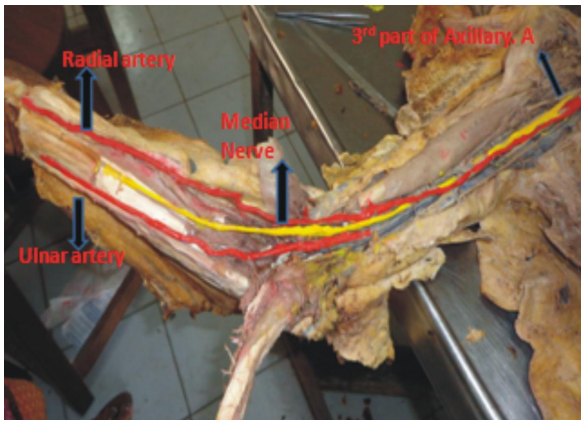
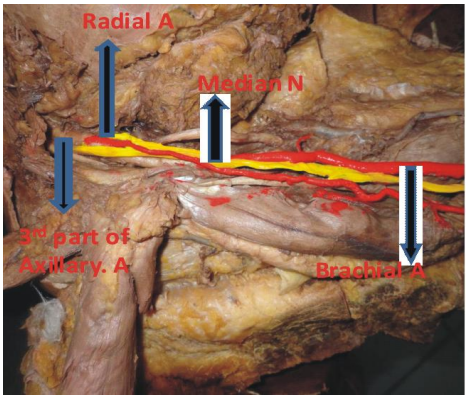
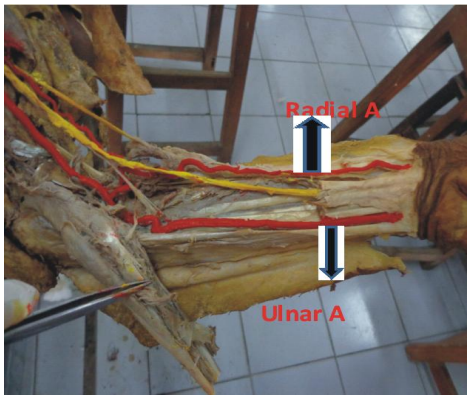
Origin of right radial artery & its course in arm & forearm.



Origin of Lt. Radial Artery



Course of Lt. Radial Artery in Arm and Forearm



palmar arch completed by the deep branch of ulnar artery.

This anomalous artery can be considered as radial artery originated from the 3rd part of axillary artery. Such an anomalous radial artery has been called a superficial brachio radial artery Because of its superficial course in arm and forearm, it is called as superficial branchio radial artery.

And this radial artery show its tourtous course and its crossing superficial to the ulnar artery make this variation special and unique. This course and nature of the radial artery may cause problems in invasive procedure.

Discussion

The variations in the branching patterns of the arteries of the limbs have clinical and surgical significance.[5]

Anomalies of the arteries of the upper limb are common, as their development is dependent upon many sources, as well as on a precise sequential pattern of the formation and regression of some of the arteries.[6]

Some of the earliest study reporton the variations in the arterial system have been made by Senior[7] and Singer[8] According to Bergman *et al* the high origin of the radial artery is seen in 15% cases and that of the ulnar artery is seen in 2% cases. This high division may occur at any point in the normal course of the vessels. But it is more common in the middle third portion of the course.[9]

The brachioradial artery one of the varieties of radial artery with anomalous origin, is the commonest arterial variation of the upper limb.[10]

Rodriguez –Niedenfuhretal Studied the variations of the arterial pattern in the upper limbs and observed that the incidence of brachioradial artery to be 13.8% where as superficial brachioradial 0.26%.[11]

The case we reported here had superficial brachioradial artery a rare variation which originated directly from the 3rd part of Axillary artery just above the formation of median nerve and this is hypoplastic in the proximal portion, which makes it difficult for angiographic procedure or guiding catheter into the Axillary arteries during cardiac catheterization.[12] Unusual origin of the

radial artery may cause failure in the reconstructive surgery of the upper limb, it can be ligated or cut considering it as a vein leading to disorder in circulation of the hand.[13]

Clinical Implication

The knowledge on the variation which has been reported here is important in procedure like cardiac catheterization, arterial grafting and other angiographic procedure. This type of a variation may cause a misinterpretation of the angio graphic images. Accidental punctures of the superficially placed arteries may occur while venipuncture are attempted, which are susceptible to damage in orthopedic and plastic surgery operation.[14]

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Case Report

Indian Journal of Anatomy
Volume 3 Number 3, July - September 2014

An Unusual Presentation of a Huge Cervical Fibroid

Bhaurao Yadav*. Raviraj Tiruke, Priyanka Vhatkar*****

Abstract

Most of the leiomyomas are situated in the body of the uterus, but in 1-2% of the cases, they are confined to cervix and usually to the supra-vaginal portion. A cervical leiomyoma is commonly single and is either interstitial or sub-serous. Rarely it becomes sub-mucous and polypoidal. A case of cervical leiomyoma admitted with pressure symptoms is being presented. Cervical fibroid of size 15 X 8 cm was arising from the posterior lip of cervix, was sub-mucous, sessile with a normal size uterus and bilateral ovaries. Total abdominal hysterectomy was done and both ovaries were left intact considering young age of patient.

Keywords: Cervical fibroid; Pressure symptoms; Abdominal hysterectomy.

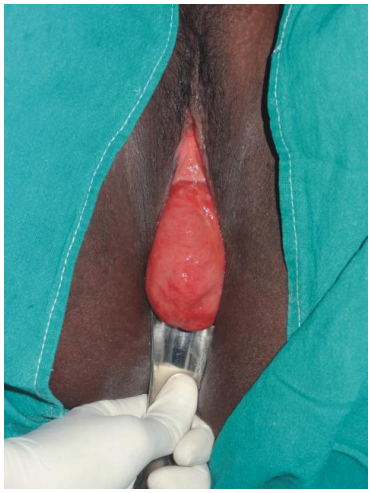
Introduction

Fibroids or leiomyomas are most common uterine tumours. Most of the leiomyomas are situated in the body of the uterus, but in 1-2% of the cases, they are confined to cervix and usually to the supravaginal portion. A cervical leiomyoma is commonly single and is either interstitial or sub serous. Cervical fibroids involved with excessive growth, may cause pressure symptoms.[1] The treatment of the symptomatic fibroid is either myomectomy or hysterectomy.

Case Report

A 30 year old woman, residing in Latur, attended Government Medical College & Hospital, Gynaecology OPD with a 1 ½ yr history of something coming out per vaginum, foul smelling vaginal discharge, scanty and irregular menstruation. Surprisingly there was no other relevant history such as urinary retention or constipation. She was Para 3 with 3 living issues and her last child birth was 6 months back and it was delivered by lower segment caesarean section done for mass in vaginum. On examination she was pale. Other general, cardiovascular and respiratory systemic examinations revealed no

Picture I: Cervical fibroid seen through introitus may confused with uv prolapse



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Reprint's Request: Dr. Bhaurao Yadav, Associate Professor, OBGY Dept., Government Medical College, Latur, Maharashtra, India.

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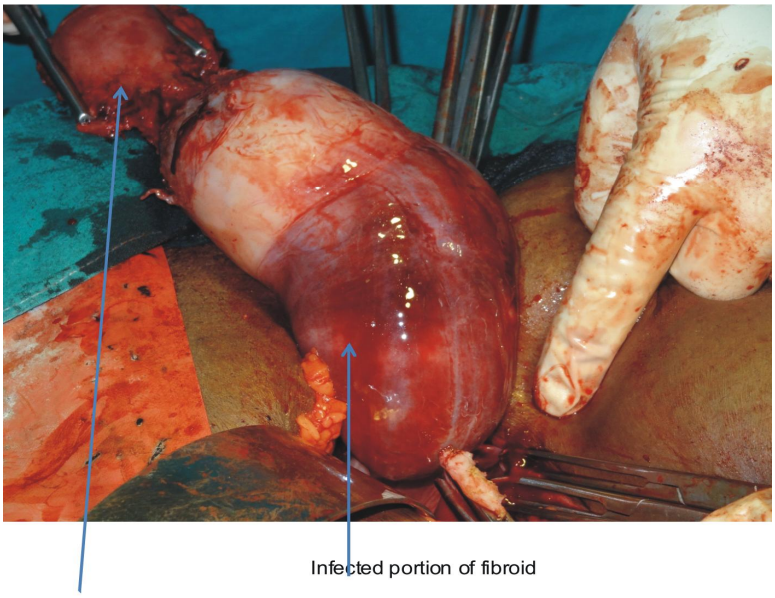
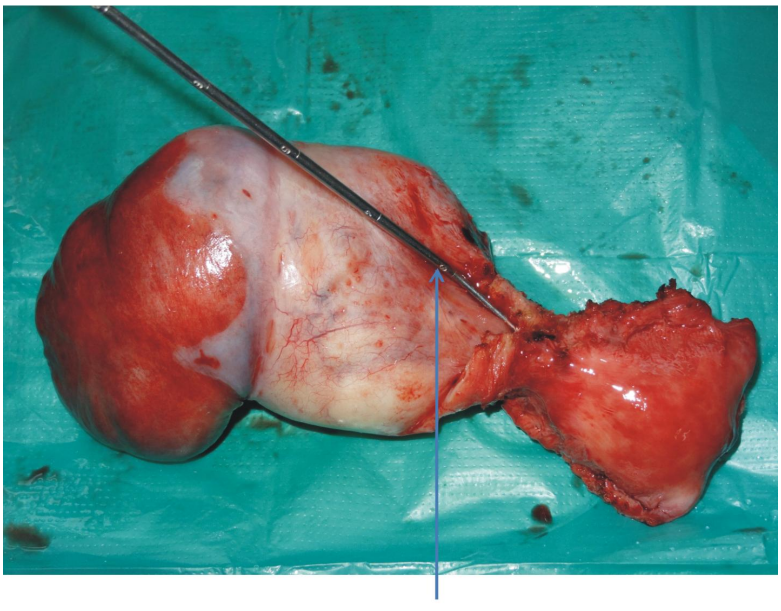
Picture II: Intra-operative picture



Picture III: Post-operative specimen



abnormalities.

Abdominal examination: About 4X4cm, firm, smooth, non-tender mass with restricted mobility was felt. There was no as cites clinically.

PS: Minimal blood discharge and a pale circumscribed mass in vagina was seen. There was also copious mucoid foul smelling discharge also.

PV: 10X6cm protruding mass continuous with the abdominal mass was felt. A thin rim of cervix was felt around the mass.

On investigations: Hb was 7.5g/dl; blood urea was 16mm/dl, & WBC count 6800. The platelet count was 1.50 lack/cc and blood film showed normocytic normochromic anaemia. Ultrasound showed a huge 10 cm x 8 cm sized cervical fibroid with normal uterus and ovaries. Exploratory laparotomy under GA revealed 2 kg single cervical fibroid of size 15 X 8 cm arising from the posterior lip of cervix, with a normal size uterus and bilateral ovaries. Total abdominal hysterectomy was done and both ovaries were left intact considering young age of patient. Patient received 2 units of blood transfusion pre-operatively, and 1 unit post operatively and her recovery was uneventful. Sutures were removed of day 10 and patient was discharged on day 14.

Histopathological report confirmed fibroid of cervical origin.

Discussion

Cervical fibroid with excessive growth are uncommon. They are grossly and histologically identical to those found in the corpus. They give rise to greater surgical difficulty by virtue of their relative inaccessibility and close proximity to the bladder and ureters.[2] Enlargement causes upward displacement of the uterus and the fibroid may become impacted in the pelvis, causing urinary retention and ureteric obstruction.[3] The present patient had a cervical fibroid which grew to occupy the pelvic cavity,

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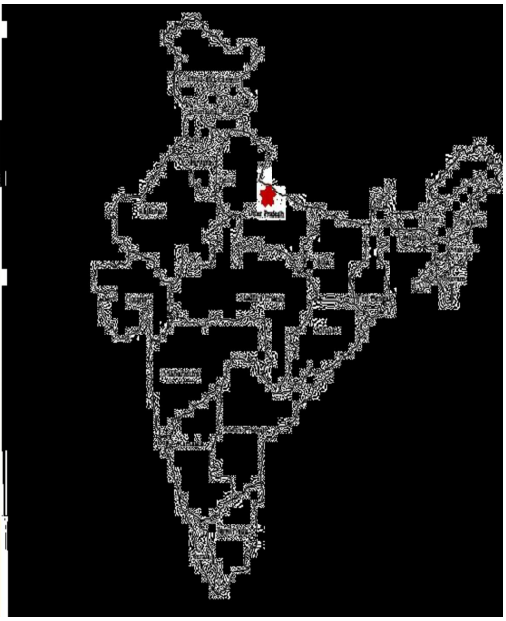

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Over 250 children in Belsar village in India, in the backwards rural District of Gonda in Uttar Pradesh (see map) will be without a school building by the end of this school year… unless we help them to pay for building materials for a new school building. Parents who are masons, carpenters and others are committed to give their free time to help and construct the building. World Without Obstacles – a registered NGO – with support of friends and family enabled this initiative.

For many years WWO already works together with a small primary school called Gurukul Children Academy. The school is financially independent from the NGO in its day-to-day operations. WWO helps to increase quality of education and health of children and their families. We already designed a future vision together with an architect and the school Principal. During school hours the new building will be used to educate 300 children and after hours WWO will give health info-sessions and vocational skill trainings to adults from the village. The multi-functional building will also be used as a regional office and accommodation for volunteers of the NGO. This will allow WWO to reach out to even more people in Belsar and Gonda District.

In total we need about INR 52 lakh to realise the complete multi-functional school building with 10 class rooms. One class room on average costs around INR 4 lakh. Phase 1 was partly financed via a global online crowd funding campaign. To allow the children continuity of education in the next school year we need to complete construction of phase 1 before monsoon. This includes the foundation, five class rooms, an office and a staircase. Phase 2 concerns the sanitation facilities for which we hope to receive a contribution from government funds.

Your support is much appreciated!

For more information: www.worldwithoutobstacles.org

Case Report

Indian Journal of Anatomy
Volume 3 Number 3, July - September 2014

Absent Median Lobe of Thyroid Gland

Sushil Kumar

Abstract

Thyroid gland is the first endocrine gland to start developing in the embryo. The gland is well known for its developmental anomalies ranging from common and frequently seen to rare ones.

1. The common anomalies include:
   a) Persistence of a pyramidal lobe with or without the fibrous cord
   b) Thyroglossal duct cyst
2. The uncommon anomalies are:
   (a) Failure of median lobe (isthmus) to fuse in the midline
   (b) Absence of a part of the lateral lobe
   (c) Ectopic thyroid
3. Thyroid hemi agenesis with or without isthmus is a rare anomaly.

An uncommon and clinically important developmental anomaly of the thyroid gland showing absent median lobe (isthmus) resulting in two separate lateral lobes, resembling two hockey sticks, is reported and discussed.

Introduction

The thyroid gland is first endocrine gland to start developing in the embryo.[1] The Thyroid primordium becomes identifiable in about 20 somites embryo as a median endodermal thickening in the floor of the developing pharynx between the first and the second pharyngeal pouches.[2] The thyroid gland develops as a median diverticulum which migrates caudally. Within few days, it becomes a bilobed structure, connected to the developing tongue by a stalk known as the thyroglossal duct.[3] The thyroglossal duct is hollow initially, but soon becomes solid. The duct passes in front of the future hyoid bone. The duct soon disintegrates. But its parts may remain along its course to form cysts, fistulae or the pyramidal lobe. The site of origin of this duct is marked by the presence of foramen caecum on the dorsum of the tongue at the junction of its anterior two third and posterior one third.[4] The thyroid gland descends in front of the future hyoid bone and laryngeal cartilages. It reaches its final position by the seventh week of intrauterine life. By that time it has already acquired two lateral lobes connected by a median lobe or the isthmus.[5]

The thyroid gland is a brownish red, highly vascular structure. It lies anteriority in the lower part of the neck against the fifth cervical to the first thoracic vertebrae. The gland is

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encapsulated by connective tissue that is continuous with the pretracheal layer of the deep cervical fascia. This outer or false capsule is loosely connected to a deeper layer of connective tissue that forms the inner or the true capsule. The space between the two capsules contains blood vessels, recurrent laryngeal nerves and the parathyroid glands.[6]

The gland consists of two lateral lobes connected in the midline by a median lobe known as the isthmus, which measures about 1.25 cm transversely and vertically. It lies against second and third tracheal rings.

A conical pyramidal lobe may be seen ascending towards the hyoid bone from the isthmus or the adjacent part of the lateral lobe. It is more often on the left side.[2]

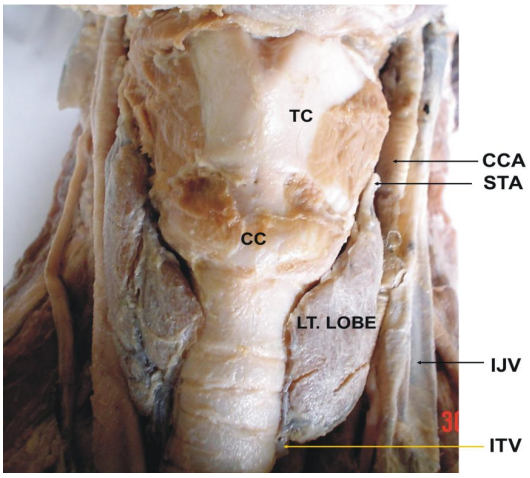
The thyroid gland has an abundant blood supply. The arterial supply to each thyroid lobe is twofold. The superior thyroid artery generally arises from the external carotid artery on each side and descends to reach the upper poles of each lobe where they branch. Each inferior thyroid artery arises from the thyrocervical trunk of the subclavian artery .It crosses beneath the carotid sheath and enters the lower or mid part of the thyroid lobe. Along the posterior border of each lobe, branches from the superior and inferior thyroid arteries anastomose. The arteries ramify on the surface of the gland; form a plexus from which branches enter the tissue. The thyroidea ima artery is sometimes present. It arises either from the arch of aorta or the brachiocephalic trunk and enters the thyroid gland in the midline. Three veins drain each lobe. The superior thyroid vein emerges at the upper pole and drains into the internal jugular vein. The middle thyroid vein emerges at the middle of lobe and either enters into the internal jugular vein or the brachiocephalic vein. Arising from the lower poles, inferior thyroid veins drain directly into respective brachiocephalic veins.[6]

Observations

The variations were observed during the routine dissection in a cadaver of a 35 years old male which was procured from the Regional Mental Hospital, Pune as an unclaimed body. No relevant clinical history was available.

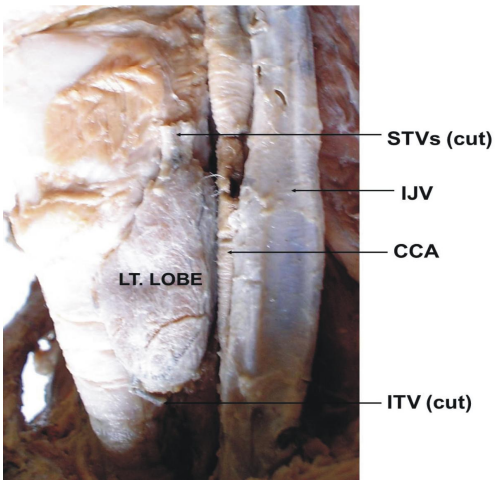
1. During dissection in our specimen two separate lateral thyroid lobes were observed, ensheathed in pretracheal layer of deep cervical fascia.

Photograph 1: Two separate thyroid lobes without median lobe (isthmus). TC: Thyroid cartilage; CC: Cricoid cartilage; CCA: Common carotid artery; STA: Superior thyroid artery; IJV: Internal jugular vein; ITV: Inferior thyroid vein

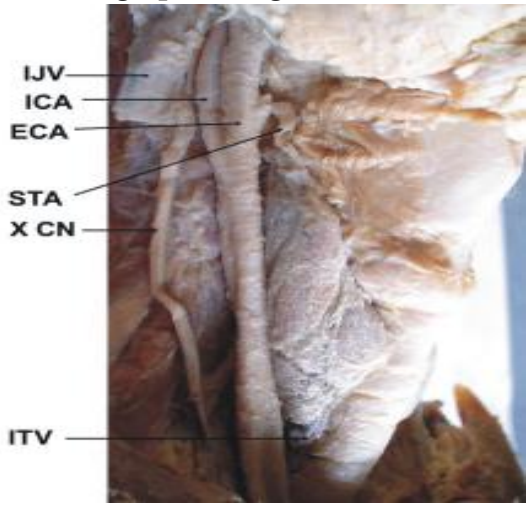


Photograph 2: Dimensions of separated lobes (Right lobe is larger)

Photograph 3: Left lateral view



Photograph 4: Right lateral view



ICA: Internal carotid artery; ECA: External carotid artery

2. The right lobe was slightly larger and higher up then the left lobe. The right lobe was measuring 5.5 cm and X 2.5 cm and the left lobe was measuring 4.5. cm X 2.3. cm.
3. The median thyroid lobe (isthmus) was absent and two separated lateral lobes were seen resembling two hockey sticks.
4. The distance between the free medial borders of two lateral lobes was 1.6 cm.
5. The medial borders of the lateral lobes were related to first to fourth tracheal rings.
6. There was no variation in the arteries supplying either lobe. No cross anastomosis was observed between the superior and inferior thyroid arteries.
7. The venous drainage was normal in both lateral lobes. Superior and middle thyroid vein were seen draining into internal jugular vein. From the lower pole of each lateral lobe emerging inferior thyroid veins were observed, draining into respective brachiocephalic veins.
8. No traces of thyroglossal duct were observed.

Discussion

Variations in the gross anatomy of the thyroid gland are relatively common. According to Burman *et al*, Marshall in 1895 was the first physician to catalogue the numerous variants observed.[7] Developmental anomalies of the thyroid gland may be classified into the following groups:

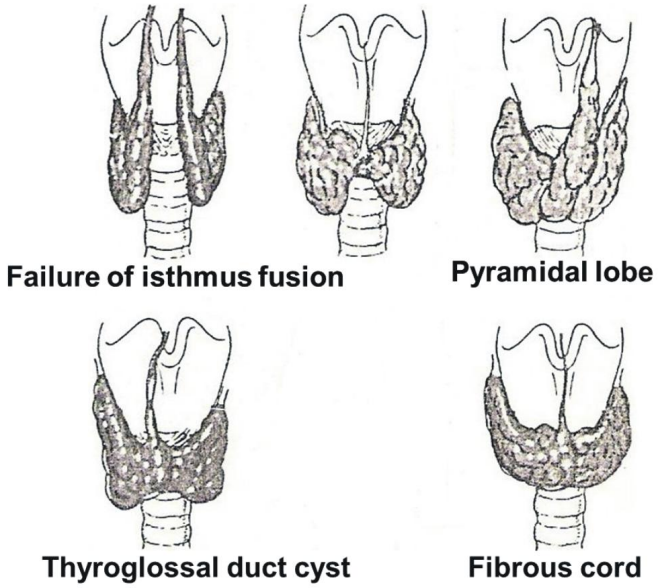
1. Common anomalies include:
   a. Persistence of a pyramidal lobe – 15-30%
   b. Thyroglossal duct cyst – 25%
2. Uncommon anomalies include:
   a. Failure of isthmus to fuse in the midline – 1%
   b. Absence of a significant part of the lateral lobe – 1%
3. Rare anomalies include:
   a. Thyroid hemi agenesis with or without isthmus.[6]

However, Frank H Netter in 1974 has described developmental anomalies of the thyroid gland as under:

1. Persistence of a pyramidal lobe – 15 %
2. Failure of median lobe (isthmus) to fuse in the midline – 1%
3. Absence of a significant part of the lateral lobe – 1 %.[8]

Absent median lobe (isthmus) is an

Fig 1: Developmental anomalies associated with thyroid gland



uncommon anomaly in which two separate thyroid lobes exist resembling two hockey sticks. The anomaly presented can be explained on the basis of developmental anatomy. Probably there is division of thyroid primordium into right and left halves along with the division of thyroglossal duct into right and left ducts. From each half of the thyroid primordium only lateral lobes developed. It is difficult to determine the true incidence of thyroid anomalies, since the diagnosis is made in patients only being evaluated for some other thyroid pathology. Thus true frequency can only be determined on the basis of large scale post mortem studies.

The normal thyroid gland is more or less always asymmetric. The right lobe may be even twice as large as the left (8). Hamburger and Hamburger in 1970 suggested that failure or an entire thyroid lobe to develop is an extremely uncommon anomaly and thyroid hemi agenesis is simply an extreme degree of asymmetry in which usually the right lobe persists.[9]

In our case is it a failure of the median lobe (isthmus) to fuse in the midline or failure of the median lobe (Isthmus) to form? Thyroidal agenesis is a congenital anomaly in which one of the lobes fails to develop. If this case is thought to be failure of the development of median lobe (Isthmus) then it can be considered as an agenesis. During our search we could trace similar cases but there were not enough references to verify it.

With the advancement of medical science and availability of diagnostic tools, diagnosis of thyroid variants and anomalies is not very difficult if the physician keeps in mind their existence. In most of the case absence of median lobe of thyroid gland is a benign condition but lack of awareness of its existence may lead to incorrect diagnosis and unnecessary surgery. When the median lobe is absent or fails to fuse with lateral lobes, the medial aspects of the lateral lobes may be misdiagnosed as tumours.[8] Melnick and Stemkowski in 1980 suggested that sonography and CAT scanning may be useful in distinguishing between developmental variations of the thyroid lobes and pathological conditions.[10]

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Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006;35:540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003;61:347-55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997;195 Suppl 2:3-9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000;71:1792-801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O, Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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