



ISSN-p:2664-5734
ISSN-o:2709-5878



LIAQUAT MEDICAL RESEARCH JOURNAL



Volume 4 Issue 3
1 July 2022 –30 September 2022



HEC Y Category





About the Journal

Liaquat Medical Research Journal is the print, online, double blind, peer-reviewed, quarterly released journal devoted to publishing innovative biomedical research and scholastic / academic content from all fields of medical sciences, concentrating on innovative clinical, diagnostic and perspective preventive research.

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The Journal aims to publish research in all fields of clinical, diagnostic, experimental & preventive areas related to medical sciences to disseminate scholastic work among clinicians and scientists around the globe.

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PANDEMONIUM OF DISEASES AFTER FLOODS – AN EMERGING MAJOR HEALTH ISSUE IN PAKISTAN

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DOI: 10.38106/LMRJ.2022.4.3-01

Received: 21.09.2022

Accepted: 26. 09.2022

Published: 30. 09.2022

ABSTRACT

Floods and heavy rain bring another disaster of diseases and pose a huge burden on the health care system. Pakistan is currently facing a major natural disaster of this decade, where Sindh and Baluchistan are badly affected. Millions of people are homeless and live in camps, shelter homes, or tent cities. The diseases that emerge immediately after floods include gastroenteritis with diarrhoea and vomiting, followed by vector-borne diseases (i.e. malaria and dengue fever) influenced by the growth of mosquitoes in the stagnant water. Due to unhygienic conditions and overcrowded camps, skin diseases emerge later. Altogether this situation causes major burden on the already weakened health care system, which is devastated due to rain and even destroyed in some places. Thus proper planning and preventive measures need to be taken on an urgent basis.

Key Words: Floods, water-borne diseases, vector-borne diseases

INTRODUCTION

Monsoon rain has badly affected more than 66 districts of Pakistan, leaving Sindh and Baluchistan devastated. Thousands of households were under water, and millions of people were displaced to other areas, temporary shelter homes and tent cities. Many shelter homes are nearby the towns under water. The people living in crowds surrounded by water has drastically affected their health. Several diseases are emerging from these areas and also from the camps where flood affectees are living. These diseases can be broadly categorised as water-borne, vector-borne, and skin diseases.

Water-borne diseases

Water-borne diseases emerge immediately after rain and floods(1). Due to floods, it is virtually impossible for local people to manage clean drinking water. Thus gastroenteritis arises as a significant health issue. Watery diarrhoea and vomiting in young children and the elderly can be lethal, raising the death toll. There are reports from Pakistan and other developing countries like Bangladesh where such disasters occur quite often. There was a report from Bangladesh where in 2004 immediately after floods, over 17000 acute diarrhoea cases were reported in a single centre (2). A similar situation was previously reported in Pakistan during floods in 2010 and 2011, where a considerably higher proportion of flood-affected children had multiple co-infections (22%) as compared to non-flood-affected children (6%)(3). Thus co-infection and then resistant pathogens lead to a significant

problem which persists even after the flood victims return home and the situation normalizes. Then there is an additional risk of other water-borne diseases, such as typhoid, worm infestation, and hepatitis A, which will be coming in the way, thus causing health emergency and posing a great burden on the health care system. Given the risk of polio in Pakistan, the water condition and damaged sanitation bring a threat of increasing polio cases in very young children. This kind of catastrophe needs proper planning in emergency situation.

Vector-borne diseases

Vectors are common in Pakistan such as mosquitoes and flies. The flood-affected areas have stagnant water in the vast land of Sindh and Baluchistan, providing the conducive environment for mosquitoes to grow exponentially. Malaria and dengue fever are prevalent in Pakistan even before floods. Still, such a high level of growth of mosquitoes spreads malaria and dengue not only in the flood-affected areas but also in the neighbouring towns and cities. The literature shows that the average rain fall rate is directly proportional to the number of dengue cases(4). Malaria and dengue in such situations can be lethal. Flies, on the other hand, spread dirty material, facilitating disease by fecal oral route. Thus a great deal on the health care system is imminent.

Skin problems

After such natural disasters, people are destined to live in camps with dirty, stagnant water and in unhygienic conditions. Due to these conditions skin diseases develop, and contiguous skin infections spread quickly, affecting children and adults equally. Both bacterial and fungal infections occur during these situations. A report from Taiwan analyzed 280 flood situations in 10 years' time, where skin and eye problems were reported to have emerged in a subacute phase after the decline of gastroenteritis(5). Thus, it can be suspected that the storm of the patients with skin diseases is on its way to hit the healthcare system in Sindh and Baluchistan.

CONCLUSION

Considering all these situations, there is a dire need for preventive strategies, restoration of the damaged/ destroyed health care system and public awareness of the emerging health catastrophe. Given the disruption of the polio campaign, it is essential that the facility may be provided within camps so that the outbreak in younger children may be controlled. Medical camps are being arranged by philanthropists, government and non-government organizations but the camp for a short period may not control the outbreak of the diseases if they emerge. The establishment of small camp dispensaries with the availability of medicines round the clock and providing public awareness for the maintenance of hygiene may serve the purpose.

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HISTOPATHOLOGICAL CHANGES IN THE PLACENTAS OF MOTHERS WITH A HISTORY OF CORONAVIRUS DISEASE 2019 INFECTION IN PREGNANCY: A COMPARATIVE CROSS-SECTIONAL STUDY

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DOI:
10.38106/LMRJ.2022.4.
3-02

Received: 31.08.2022
Accepted: 19. 09.2022
Published: 30. 09.2022

ABSTRACT

This study aimed to evaluate histopathological changes in the placentas of mothers who had contracted COVID-19 during pregnancy. This prospective study involved the histopathological assessment of two groups of placentas submitted for evaluation to the Department of Histopathology at Khoula Hospital, Oman. The first group consisted of 48 placentas derived from COVID-19-positive pregnant women delivered at the centre between March 2020 and March 2021. The control group consisted of an additional 48 placentas derived from asymptomatic mothers who were not tested for COVID-19 but were assumed to be negative. All placentas underwent gross and microscopic histopathologic examination. Placental lesions were classified according to the Amsterdam system. There was a significantly higher frequency of fibrin thrombi at the terminal villi in placentas derived from the COVID-19-positive group compared to the control group (72.9% versus 0%; *p-value* = 0.001). Also, villous hypoperfusion was significantly more common in COVID-19-positive placentas than in controls (16.7% versus 0%; *p-value* = 0.006). However, no significant differences between the two groups were noted with regards to the frequency of other histopathologic features, including decidual vasculopathy, chorioamnionitis, funisitis, intervillitis, perivillous fibrin deposition, and infarction.

Key Words: Placenta, COVID-19, SARS-CoV-2, maternal infection, histopathology.

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a viral infection caused by a new strain of coronavirus belonging to the severe acute respiratory syndrome (SARS) family, known as SARS-CoV-2. The virus was previously unreported in humans and genetically similar to the strain responsible for causing the SARS outbreak in 2003 (1). Patients infected with COVID-19 may present with a wide range of symptoms from fever, fatigue, and cough to severe complications such as shortness of breath and chest pain or even acute respiratory distress syndrome, septic shock, multiorgan failure, coagulopathy, and death (2). Transmission occurs by inhaling contaminated droplets and close contact with infected persons and contaminated surfaces (3).

The initial outbreak of COVID-19 was first reported in Wuhan, China, in December 2019, and has since spread rapidly over the last two years into a global pandemic with millions of confirmed cases and deaths worldwide (1, 2). However, inconsistent findings have been reported in the literature with regards to the possibility of transplacental transmission and placental changes as a result of COVID-19 infection during pregnancy. Several studies and case reports have suggested the possibility of transplacental transmission, of which some have reported fetal deaths attributed to COVID-19 (4-11). On the other hand, other researchers have suggested that transmission of the infection is not possible during pregnancy due to the placental fetomaternal barrier (12-15).

Moreover, conflicting data and differing histological findings have been noted in placentas derived from cases of positive COVID-19 infections (16-18). Some studies have demonstrated that COVID-19 infection is associated with significant placental hypoperfusion, decidual vasculopathy, and other features of maternal vascular malperfusion (19-23). Another study also described elements of fibrin deposition, chronic intervillitis, and trophoblast necrosis (24). In general, there is limited information available regarding the effect of SARS-CoV-2 infection on the placenta overall, and no previous research has yet been conducted to assess this topic in Oman. Therefore, the objective of this study was to evaluate histopathological changes in the placentas of women in Oman who had contracted COVID-19 during pregnancy.

METHODS

This prospective comparative cross-sectional study was conducted at the Department of Histopathology of Khoula Hospital, a tertiary reference hospital that receives cases from all *wilayats* (counties) of Muscat Governorate, Oman. All placentas submitted for histopathological evaluation to the department were included in this study. Placentas in the case group were derived from COVID-19-positive pregnant women who had delivered at the hospital between March 2020 and March 2021, during the peak of the pandemic in Oman. Eligible cases included placentas derived from pregnant women with laboratory-confirmed diagnoses of COVID-19 infection with polymerase chain reaction (PCR) testing for SARS-CoV-2 using nasopharyngeal swabs collected during their antenatal check-ups or at the time of delivery. Only the placentas of those who had delivered at 26–40 gestational weeks were sent for gross and microscopic histopathological examination. Placentas derived from women who had delivered at ≤ 25 gestational weeks were excluded from the analysis.

For comparison, an equal number of placentas were derived from asymptomatic women with no significant close contact with COVID-19-positive cases and had not undergone PCR testing for COVID-19 during pregnancy or at the time of delivery were included. As per the hospital's institutional policy, patients were tested for COVID-19 only if they were symptomatic or reported having had close contact with positive cases. However, as placentas from healthy patients are not routinely sent for histopathological examination, placentas in the control group included those submitted for evaluation due to specific indications such as poor fetal outcome or concerning obstetric history, including intrauterine growth restriction (IUGR), oligohydramnios, chronic hypertension, pregnancy-induced hypertension (i.e., gestational hypertension as well as pre- or postpartum preeclampsia), pre-existing or gestational diabetes, and coagulopathy.

Placentas for both cases and controls underwent gross and microscopic histopathological examination. Placental lesions were identified according to the Amsterdam classification system (25). The placentas were fixed in 10% buffered formalin for 72 hours or longer. The gross examination included recording the placental weight, placental disc dimensions, and a description of the umbilical

cord, membranes, and any lesions. Sections submitted for analysis included 3-mm-thick tissue sectioned at 5-mm intervals of various parts of the placenta, including the membrane rolls, two cross-sections from the umbilical cord, two full-thickness sections of the placental disc, and representative sections of any lesions. All sections underwent routine processing and were embedded in paraffin blocks; subsequently, the cut tissue (4- μ m) was placed on glass slides and stained using hematoxylin and eosin (H&E) before being submitted for microscopic examination. Two experienced pathologists reviewed histologic findings using the Amsterdam classification system (25).

STATISTICAL METHODS

The COVID-19 infection status of the cases and controls was determined from information gathered using the electronic medical record system and information regarding obstetric and fetal outcomes. Data analysis was carried out using the Statistical Package for the Social Sciences (SPSS), version 23.0 (IBM Corp., Armonk, New York). Descriptive statistics were used to describe the characteristics of the sample. Frequencies and percentages were reported for categorical variables, whereas means and standard deviations were used to present continuous variables. Pearson's Chi-squared (χ^2) test or Fisher's exact test (for low cell frequencies) was used to assess significance as appropriate, with a *p*-value of ≤ 0.05 considered statistically significant.

RESULTS

A total of 96 placentas submitted for evaluation to the histopathology department were included in the study, out of which 48 were cases (i.e. COVID-19-positive), and there was an equal number controls (i.e. COVID-19-negative) (*n* = 48 each). The mean gestational age of the infected and control groups was 37.5 ± 2.5 weeks (range: 26-40 weeks) and 35.25 ± 5.2 weeks (range: 15-41 weeks), respectively. In the case group, the timing of COVID-19 testing varied, with 16 cases (33%) testing positive on the day of delivery, 16 (33%) within the week prior to delivery, 12 (25%) two weeks before delivery, and four (8%) more than two weeks before delivery.

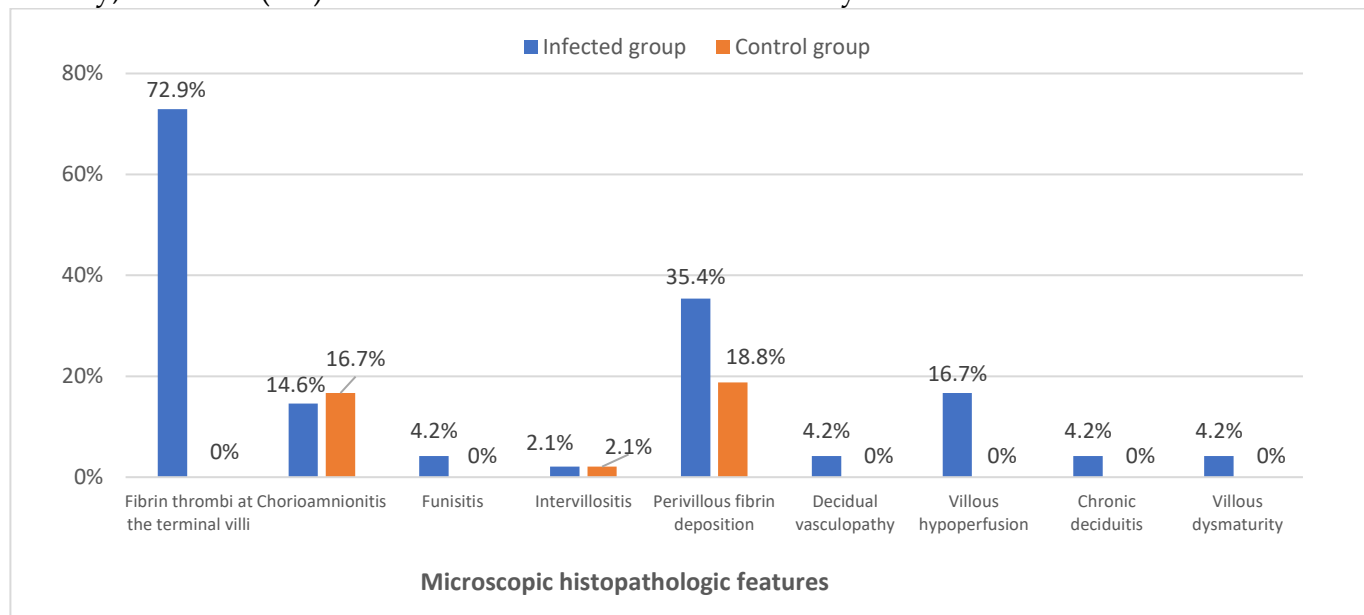


Figure. 1. Bar chart comparing the frequency of microscopic histopathological findings between control placentas and those derived from mothers with a history of COVID-19 infection in pregnancy

The H&E-stained slides of placentas in both the control and case groups were examined. Figure 1 illustrates the frequency of microscopic findings recorded in both groups, including fibrin thrombi at the terminal villi, perivillous fibrin deposition, decidual vasculopathy, chorioamnionitis, villous hypoperfusion, funisitis, and intervillitis. Two statistically significant differences between the groups were observed. First, there was a significantly higher frequency of fibrin thrombi at the terminal villi in placentas derived from COVID-19-positive cases compared to controls (72.9% versus 0%; p-value = 0.001) (Figure 2a). Second, villous hypoperfusion was significantly more common in COVID-19-positive placentas compared to controls (16.7% versus 0%; p-value = 0.006) (Figure 2b).

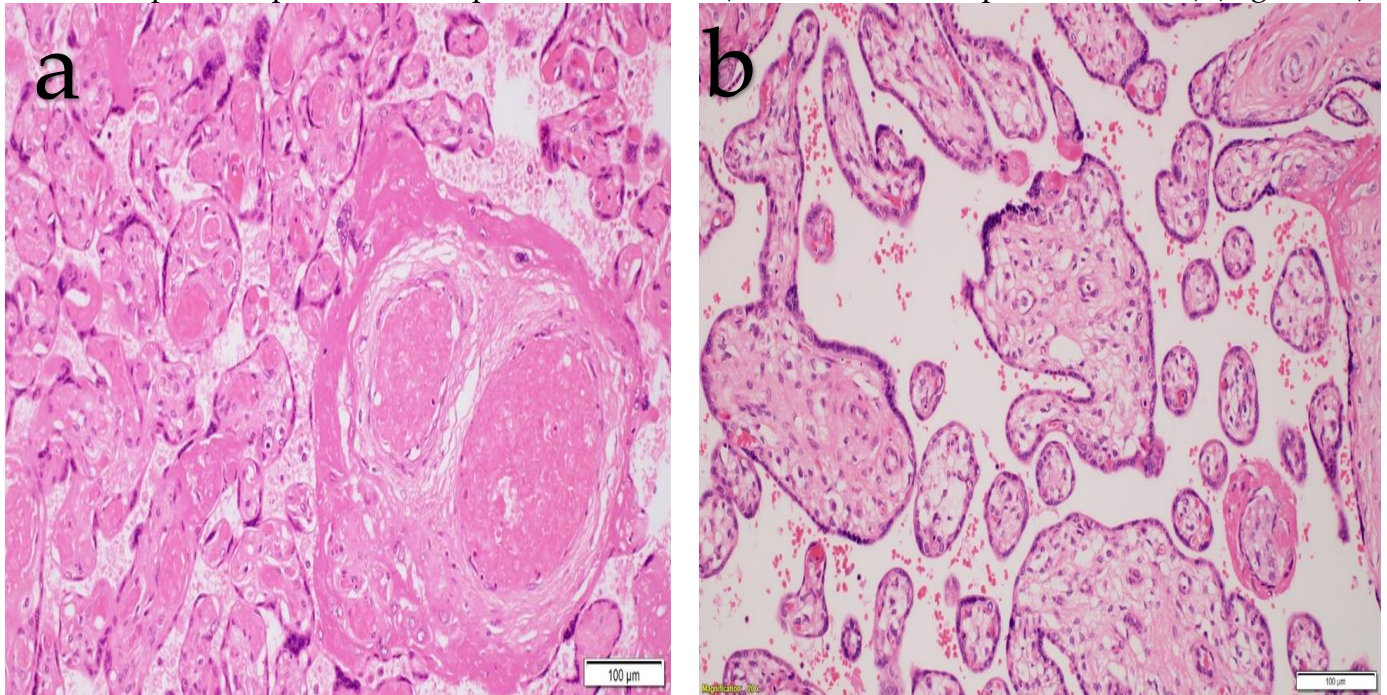


Figure 2. (a) H&E-stained slide of placental tissue derived from a COVID-19-positive pregnant woman showing fibrin thrombi at the terminal villi. (b) H&E-stained slide of placental tissue derived from a COVID-19-positive pregnant woman showing villous hypoperfusion

In contrast, no significant differences were noted between cases and controls with regards to the frequency of other histopathological features, including decidual vasculopathy, chorioamnionitis, funisitis, intervillitis, perivillous fibrin deposition, and infarction (Figure 3a-d). With regards to neonatal outcomes, there was a higher frequency of intrauterine fetal death (IUFD) (31.3% versus 10.4%; p-value = 0.023) and prematurity (22.9% versus 6.3%; p-value = 0.023) in the control group compared to the case group (Table 1). However, no significant association was found between COVID-19 infection status and low-birth-weight (<2.5 kg) infants (6.3% versus 4.2%; p-value = 0.87).

Table 1. Comparison of Pregnancy Outcomes in Mothers with and without a History of COVID-19 Infection in Pregnancy (N = 96).

		Outcome, n (%)				Total
		Healthy	Intrauterine Fetal Death	Anomaly	Premature birth	
Group	Infected	40 (83.3)	5 (10.4)	0 (0)	3 (6.3)	48
	Control	20 (41.6)	15 (31.3)	2 (4.2)	11 (22.9)	48

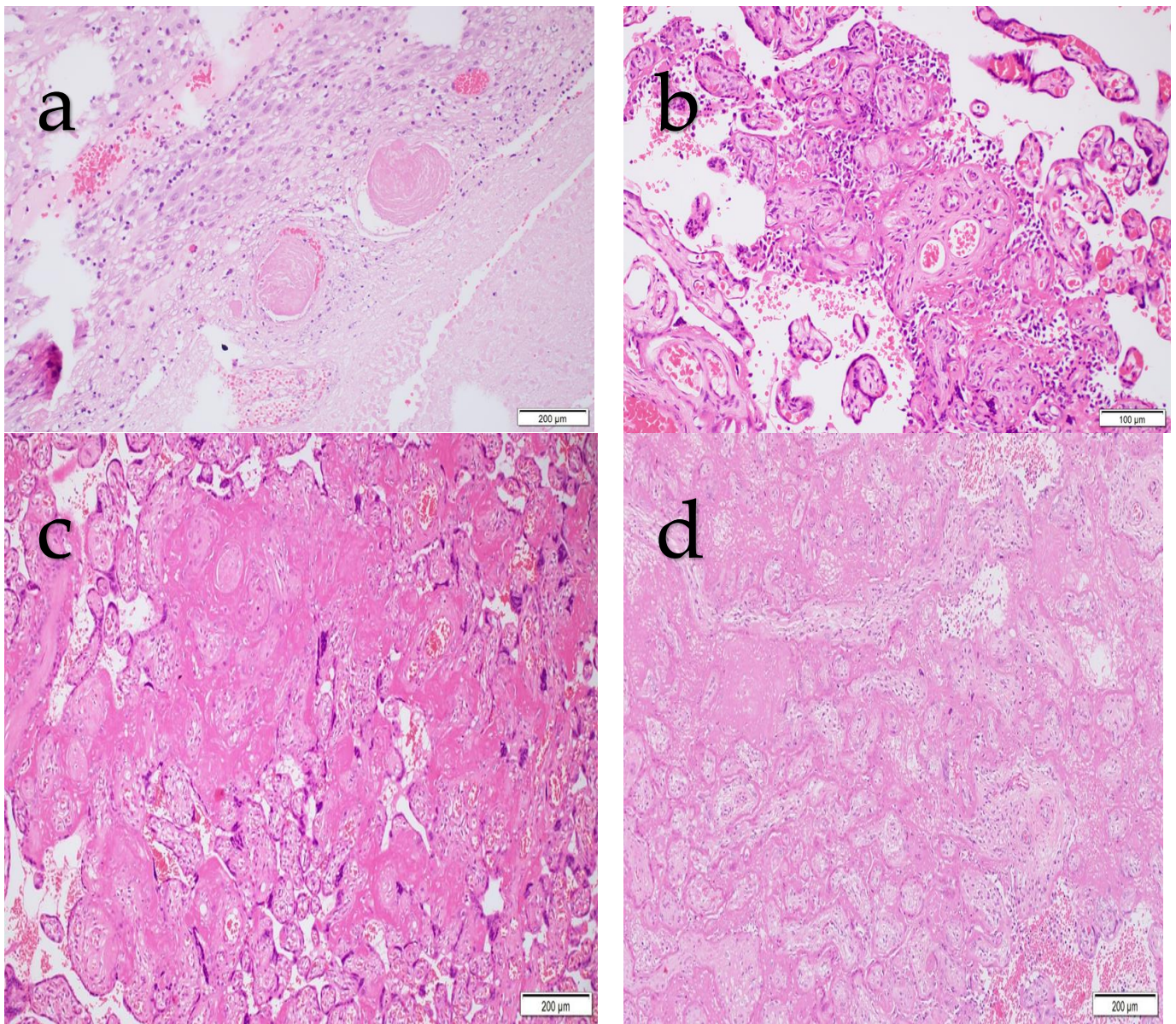


Figure 3. Hematoxyline and Eosin slides of placental tissue derived from COVID-19-positive pregnant woman (a) Showing thrombi within decidual blood vessels in a case of maternal vasculopathy. (b) Showing chronic intervillitis. (c) Showing intervillous fibrin deposition. (d) Showing infarction of villi

DISCUSSION

To date, limited information is known regarding the effect of COVID-19 on the human placenta and whether vertical transmission of the infection from mother to infant is possible. Several studies have sought to assess the pathology of the placenta in COVID-19-positive mothers, with varying results (16-24). In the current study, a statistically significant relationship was observed between COVID-19 infection status and the presence of fibrin thrombi within the terminal villi blood vessels (72.9% versus 0%; p -value = 0.001). This finding may represent underlying pregnancy-specific sequelae of COVID-19-associated coagulopathy. Similar findings have been reported by Menter *et al.* (21).

Our study further demonstrated a significant relationship between COVID-19 infection status and the frequency of villous hypoperfusion (16.7% versus 0%; p -value = 0.006). Villous hypoperfusion is primarily caused by the narrowing and reduction of the number of terminal villi blood vessels; specifically, 25% of cases of villous hypoperfusion in the present study demonstrated terminal villous thrombi. Fetal vascular narrowing is usually diagnosed via the morphometric analysis of placental

material in the clinical context of marked IUGR and abnormal pulsed flow Doppler results. However, in our study, information regarding history of IUGR was not available and Doppler studies were not performed. Nevertheless, several previous studies have shown significant findings of fetal vascular malperfusion. Glynn *et al.* found that fetal vascular malperfusion lesions were significantly more frequent among pregnant patients with a history of acute SARS-CoV-2 infection (26). Similarly, Baergen and Heller demonstrated that 50% of COVID-19-positive mothers in their study showed some evidence of fetal vascular malperfusion, including intramural vascular thrombosis, villous stromal-vascular karyorrhexis, and intramural non-occlusive thrombi (27).

No statistically significant differences in the frequency of other microscopic findings were observed in the present study, including perivillous fibrin deposition, maternal vasculopathy, chorioamnionitis, funisitis, intervillitis, and villous dysmaturity. Similar histological findings were also observed in other studies without statistical significance (9, 11, 28, 29). In particular, perivillous fibrin deposition was apparent in 17 (35.4%) of the placentas derived from COVID-19-infected patients; however, this feature was also present in 11 (22.9%) placentas in the control group. Singh *et al.* reported that the main placental histopathologic findings in a series of COVID-19-infected patients were increased fibrin in addition to microcalcifications, syncytial knotting, and villous agglutination (30). Other case reports have found the main histological findings to be intervillitis (24, 31, 32) and infarction (22). Such features were not observed in the present study. In addition, several researchers have indicated that the frequency of maternal vascular malperfusion is significantly higher in placentas derived from SARS-CoV-2-positive pregnancies (13, 20-23, 33). However, this finding was not statistically significant in our study, with only two COVID-19-positive cases (4.2%) showing maternal vasculopathy.

Moreover, there was no statistical difference in terms of gestational age between cases and controls in our study, with 40 (83.3%) patients in the COVID-19 positive group having full-term normal deliveries and only three (6.3%) going into premature labor at 26–36 gestational weeks. This finding was also noted in other studies (6, 25). On the other hand, the control group showed a high proportion of premature births ($n = 11$; 22.9%). Moreover, there was a significantly increased frequency of IUFD among control cases (31.3% versus 10.4%; $p = 0.023$). This was likely because only the placentas of mothers with a concerning obstetric history are usually submitted for histopathological evaluation.

Of the five cases of IUFD in COVID-19-positive mothers, three (60%) were born premature and one was full term. The causes of both the prematurity and IUFD varied, including maternal hypertension, polyhydramnios, and severe symptomatic maternal COVID-19 infection. In the existing literature, cases of fetal death have been reported in women with confirmed COVID-19 infection, severe clinical symptoms, and premature delivery (12), as well as those with confirmed COVID-19 infection without any significant clinical or obstetric disorders, thereby suggesting that fetal demise may be a possible outcome of COVID-19 infection in pregnancy (6, 34). Two studies involving 106 and 50 cases of SARS-CoV-2 infection in pregnancy, respectively, did not show any IUFD (23, 26). In addition, no statistically significant relationship between COVID-19 infection and low birth weight was found in the current study (6.3% versus 4.2%; $p = 0.87$). Similar observations have been made in other studies (22, 27).

While the findings of our study can be considered reliable, generalizability is limited due to the sampling procedure, given that the samples were collected from a single center. In addition, it is important to note that the placentas in the control group were derived from mothers with poor or concerning obstetric histories since healthy placentas are not routinely sent for histopathological

examination. Moreover, women in the control group were not tested for COVID-19 infection and were presumed to be COVID-19-negative because they were asymptomatic or had had no close contact with COVID-19-positive cases, as per hospital protocol. Finally, since the duration of infection in some cases was short or the infection was only diagnosed on the day of delivery, some infected cases might not yet have shown any histological changes at the time of analysis.

CONCLUSION

In summary, placentas derived from COVID-19-positive mothers showed a significantly increased prevalence of terminal villous thrombi and fetal vascular malperfusion relative to the controls. The findings of this research are important as COVID-19 is still an emerging disease, and such results may help clinicians and obstetricians in their future decision-making.

ETHICAL CONSIDERATION

Ethical approval for this study was obtained from the Research Ethics Committee of the Directorate General of Khoula Hospital, Ministry of Health, Oman (PRO022021077). This study was conducted in compliance with the ethical standards of the responsible institution on human subjects as well as with the Helsinki Declaration. This study involved no direct contact with patients, as all placentas were submitted directly to the histopathology department for evaluation. Consent to evaluate the placentas utilized in this study was granted by the Research Ethics Committee of the Directorate General of Khoula Hospital, Ministry of Health, Oman.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

FUNDING

None to declare.

AUTHORS' CONTRIBUTIONS

H.K conceived the presented research idea and went through literature review. N.M and S.A under the supervision of H.K. designed the research methodology and have reviewed the slides. N.M and S.A. were involved in the data collection and data entry. N.M, S.A, M.G and H.K analyzed and interpreted the results. H.K. was a major contributor in writing the manuscript in consultation with M.G. and R.K. H.K was the research supervisor who guided N.M and S.A throughout the project. All authors read and approved the final manuscript.

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CLINICO-EPIDEMIOLOGICAL EVALUATION OF CHRONIC FOLLICULITIS OF LEG- A SINGLE STUDY FROM SOUTHERN INDIA

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DOI:

10.38106/LMRJ.2022.4.3-03

Received: 29.07.2022

Accepted: 09. 08.2022

Published: 30. 09.2022

ABSTRACT

This study was conducted to determine the clinico-epidemiological evaluation of chronic folliculitis of the leg in the southern Indian population. This was a prospective observational study, undertaken over a period of two years. All patients attending the outpatient department Southern Indian tertiary care hospital's Dermatology Department (M.K.C.G. Medical College & Hospital, Odisha) were recruited. A total of 100 patients were enrolled, aged between 12 to 70 years with a M: F ratio of 10.1: 1. Eighty per cent of the population in the study were rural, and 20% belonged to the urban area. Clinical characteristics and demographic data of the patients were collected in a pre-designed proforma. Those patients who had pustules on the leg underwent pus culture and sensitivity test. Majority of the patients presented with papules and pustules (96% cases) and bilateral symmetrical leg involvement (98% cases). Pruritus was the most common clinical presentation (90% cases). Staphylococcus was isolated in the majority of cases (80%) and was sensitive to Amikacin (73%), Linezolid (70%), vancomycin (68%), and Gentamycin (65%). Chronic folliculitis of the leg is mainly a disease of young adult males of low socioeconomic status. Avoiding aggravating factors and cautious use of sensitive antibiotics may achieve treatment goals and decrease recurrence.

Key Words: Chronic folliculitis, Leg infection, Staphylococcus aureus

INTRODUCTION

Chronic superficial folliculitis of the leg (CFL), resulting from inflammation of terminal parts or ostium of the hair follicle having either infective or non-infective aetiology. Historically this disease was described under various names like Nigerian shin disease (1), chronic folliculitis of the leg (2), therapy-resistant pyogenic folliculitis of the leg (3), epilating folliculitis of glabrous skin, lupoid syphilis of the legs (4), and, more recently, chronic superficial folliculitis of the leg (5).

The clinical characteristics of the disease include recurrent, symmetrical, itchy eruptions of papules or pustules of both lower legs with skin oedema and erythema that upon healing, results in alopecia,

atrophy and scarring. The disease course in tropical countries is either self-limiting or prolonged, remitting and relapsing (6). Occupations prone to repeated minor trauma such as agricultural workers, cement workers, having history of application of oil over the body, contact with seawater, and cow dung are documented exacerbating and precipitating factors (1,6,7). Pruritus is the most common symptom of CFL, followed by pain, bleeding, hair loss, and eczema.

A similar condition affecting both lower legs symmetrically with or without extension to the thigh or forearm was found in Lagos in West Africa named Pustular Dermatitis Atrophicans (8). This disease was thought to be uncommon in India and associated with recurrence and unsatisfactory treatment outcome. Thus this study was conducted to evaluate clinical profile and demography of all CFL cases attending our centre and to explore bacteriological profile and antibiotic sensitivity.

METHODS

This was a prospective observational study, conducted at the Department of Dermatology, Maharaja Krushna Chandra Gajapati (M.K.C.G.) Medical College & Hospital, Odisha, India from January 2009 to January 2011. The college's Ethical committee permitted the study.

All patients with chronic folliculitis of legs for more than six months duration diagnosed clinically and did not receive any treatment for a minimum of three months before recruitment in the study. The patients consented to be part of the study and underwent study procedure of Pus culture & sensitivity were included. However, patients with acute folliculitis of leg less than six months or Chronic folliculitis or those on medications for three months were excluded. All immunocompromised patients or those on immunosuppressant treatment were also excluded. Those patients who refused to consent or did not show willingness for follow-up were not included.

A detailed history was taken from all the patients recruited in this study, including age, sex, occupation, socioeconomic status, significant past and family history, previous dermatological diseases, predisposing and seasonal factors, onset, duration, evolution of the lesion, and type of lesion, distribution of lesion and clinical features. Finally, a thorough examination was done to find distribution, lesion morphology, and any evidence of pre-existing dermatological disorder.

All patients underwent routine blood investigations, including complete blood count, random blood sugar, renal function test, liver function test, HIV test, detailed urine report, gram staining of pus, and culture and sensitivity were performed. After stopping topical and systemic medications for a week, pus culture and sensitivity were done. Then, the lesion was swabbed with alcohol, and pus was collected using a sterile swab. In crusted lesion, parts were partly lifted with a sterile needle and material underneath was taken. After collection, pus was sent to the microbiology department, where gram staining and pus culture were done in blood Agar/Mac Conkey agar with incubation aerobically at 37°c 24hr. Organisms were grown and identified by their morphology, cultural characteristics and biochemical reactions. Antibiotic sensitivity was tested on nutrient agar using Bio-dis (Hi-media)R disc diffuse techniques.

STATISTICAL METHODS

All the data were entered and analysed into Microsoft Excel sheet. Descriptive statistics were done for demographic variables and presented in charts and tables with number, ranges and percentages.

RESULTS

A total of 100 patients with a confirmed diagnosis of CFL were enrolled, aged between 11years to 70years, most were in the age group between 21 to 30 years (45%), followed by 11 to 20 years (23%). A summary is given in Table 1. The majority of the patients were males with a male: female ratio of

10.1.1. A considerable proportion of the study population reported from lower socioeconomic groups (77%) and rural areas (80%). Table 1 presents a summary of the demographic characteristics of the study population.

Table 1. Summary of chronic superficial folliculitis of leg Cases Demographic characteristics

Age group(years)	Male	Female	Total (%)	Socio-economic status		Habitat	
				Middle	Low	Urban	Rural
0-10	0	0	0				
11-20	19	4	23	M(4)	L (19)	7	16
21-30	42	3	45	M(8)	L (37)	10	35
31-40	19	2	21	M(5)	L (16)	2	19
41-50	8	0	8	M(2)	L (5)		8
51-60	1	0	1		L (1)	1	
61-70	2	0	2		L (2)		2
Total	91	9	100		100	20	80

Analysis of the distribution of the occupation it was found that, highest number of farmers (n=45, 45%) was presented followed by students (n=14, 14%) and cement workers (n=13, 13%). Figure 1 presents occupations of the patients. In 70 patients, lesions appeared, or pre-existing lesions aggravated in summer and rainy sessions, while in the remaining 30 cases, no definite relationship with season was found. Seborrhic manifestations of variable degree (10%), positive HIV serology (4%), psoriasis (2%), sycosis barbae (2%) and lichen planes lesion (1%) were found in the present study(Figure-2).

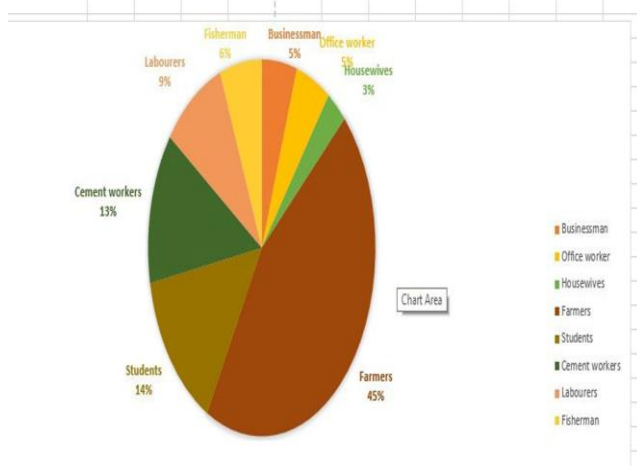


Figure 1 Occupation-wise distribution of of chronic superficial folliculitis of leg cases

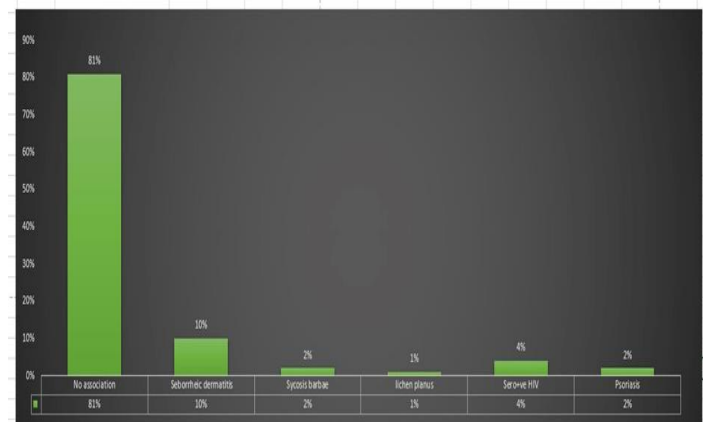


Figure 2 Association of chronic superficial folliculitis of leg to other diseases

The disease duration varied from a minimum of 6 months to a maximum of 14 years, with 78(78%) patients attending hospital within one year of onset (Table-2). In almost all cases (n=96, 96%), the lesions appeared as multiple, small, closely set follicular pustules with papules, some intact and some crusted. Isolated papules (3%) and pustules(1%) though found, were rare in our study(Table 2). It was observed that, folliculitis was distributed in all cases, chiefly over the pretibial region of one (2%) or both legs (98%) between the knee and ankle (Table-2, Figure 3). The dorsal skin and other areas of glabrous skin were not affected. Lesions extending to thigh and thigh + forearm found in 24% and 1%

cases respectively (Figures 4 and 5). Pruritus was the predominant symptom (90%) followed by burning sensation (25%), pain (9%) & bleeding (2%) (Table-2). On the resolution of lesion, loss of hair was found in 78% of cases (Figure 6).

Table 2. Summary of clinical characteristics of the patients presenting with chronic superficial folliculitis of leg (CFL)

Duration of CFL	No of Patients	% of total
<1 year	78	78
1 year to 10 year	20	20
>10 year	2	2
Types of lesions	No of Patients	% of total
Papules only	3	3
Pustules only	1	1
Both	96	96
Distribution of lesions	No of Patients	% of total
Both legs	98	98
One leg	2	2
Leg and thigh	24	24
Leg and forearm	1	1
Clinical features	No of Patients	% of total
Pruritus	90	90
Burning sensation	25	25
Pain	9	9
Bleeding	2	2
Scaling	20	20
Eczematisation	4	4
Loss of hair on the resolution	78	78
Mild atrophy of skin	30	30



Figure 3: Chronic superficial folliculitis of leg case showing both papules and pustules



Figure 4: Chronic superficial folliculitis of leg case extending towards the thigh



Figure 5: Chronic superficial folliculitis of leg case extending towards the forearm



Figure 6: Chronic superficial folliculitis of leg case showing scaling, hair loss and mild skin atrophy

Direct smear examination after gram stain showed clusters of staphylococci with plenty of pus cells in 80% of cases, while in remaining 20% of cases; pus cells were only seen, which may be due to technical error. Pus culture was done in 97% of cases, and staphylococcus was the commonest organism found, isolated in 80% of total cases (Table-3). Sensitivity to various antibiotics was described in Table 4. Though all cases respond to treatment within two months of therapy, 10% of cases had a recurrence of lesions within one year, and 30% of cases had recurrence within two years of the beginning of treatment.

Table-3: Organisms Isolated from Pus Culture

Organisms Isolated	No of Patients	% of total
Staph. aureus	80	80
Coagulase -ve Staph.	2	2
Pseudomonas spp	7	7
Klebsiella spp.	3	3
Beta haemolytic Strepts	2	2
E Coli	1	1
Pus not collected	3	3
Pus was sterile	2	2
Total	100	100

Table -4: Antibiotic sensitivity of Organisms

Antibiotics	No of Patients	% of total
Amikacin	73	73
Linezolid	70	70
Vancomycin	68	68
Gentamycin	65	65
Gatifloxacin	30	30

DISCUSSION

Chronic folliculitis of the leg runs a chronic course; it hardly melts or burns; it simply smoulders. CFL is predominantly a disease in the second and third decades, as reported from various kinds of research literature (1,6,7,8,9,10), which coincides with the present study, where 45% and 23% of cases were in the third and second decades. However, recent literature by Saranya TM et; claimed a little higher age of onset of CFL (5). This disease has been reported to occur up to the sixth decade (6), like our study, where only (2 patients, 2%) were more than 60 years. On the contrary Nigerian study shown none of the parents was more than 30 years (11). The pasha S.K.J. et al. study documented that only 24% of patients were over 30 years (12). It shows the existence of age variation among patients of CFL. In our study cohort, male dominance was found with M: F ratio of 10.1:1, comparable to many other studies(3,6,7,9,10,13,14). However, Harman RR et al. recorded equal sex distribution which is in

contrast to our study(1). More manual labour and risk factors explain this high predisposition of males to CFL.

The majority of patients in this study were agricultural laborers (45%), which is almost the same as that was reported by Prasad P et al. (44%)(2). The high incidence of CFL among farmers may be due to frequent minor trauma to the leg during working in the field and exposure to mud, pesticides & allergens. Students(14%), business personnel(5%) and office workers (5%) in our study constituted less number of cases, mostly belonging to the urban population. The excessive friction from clothing, use of tight-fitting long trousers, high external humidity, excessive sweating, and application of vegetable oil may be possible causes of C.F.L. in the above cases, even though no type of occupational trauma could be found.

Cement workers constituted 13% of our study population, comparable to construction workers (7,17.9%) to Saranya TM et al.(5) and discordant with to study by Rama R et al. (8%) (8). Moreover no previous studies had reported that cement being an irritant affects quite a good population.

Though our patients hail from coastal villages, there were only six fishermen (6%) cases which was similar to other studies(2,8); on the contrary, only one case was a fisherman reported by Saranya TM et al. (5). Though there are discrepancies among various study groups, it may be suggested that seawater exposure is a risk factor for CFL.

Our study showed that most patients were from rural areas (80%) and a low socioeconomic group(77%). Most of our patients (reported exacerbations during the summer and rainy season70%), similar to summer exacerbations by various studies reported in the literature (1,5,6,8,10,14). The role of humidity in exacerbations may be a postulation. Few previous literatures reported vitiligo (2%),leprosy(4%) and Psoriasis(2%) as co-existing diseases in chronic folliculitis(1,2). One recent study by Sanaya TM et al. showed no other skin diseases, Psoriasis and contact dermatitis in 44 (88%), 3(6%), and 3(6%)cases, respectively, this was comparable to our study. Any common pathological mechanism between CFL and other associations, if present, need to be clarified by further studies.

The disease duration in our study varied from 6 months to 14years was discordant with certain previous studies (5,6,10). In contrast, a short duration of disease onset (8 weeks to 2 years) was reported by Tiwari V. et al. in his study of 15 patients(15). Furthermore, most patients in our study (78%) were attending hospitals within 1 yearr of the onset of the disease, which is discordant with certain previous studies(2,5). On the other hand, a study by Sugathan P et al. (6) reported that 4% of patients had a disease of more than 10 years, which is nearer to our study.

Familial affection for CFL was not documented in our patients, while some previous studies reported conflicting results (6,13,15). Bilateral symmetrical affection of the lower leg was seen in most cases(98%) in our study. Similar affection was also documented by various authors previously(6,14,15). Most of the literature demonstrated the anterior and lateral aspect of the leg being the most common site of the lesion (1,5, 6, 10), like ours. No posterior affection of the leg was found in our study in contradiction to Saranya TM et al., where 2(4%) patients had follicles on the back of the leg. The dorsal feet and other areas of glabrous skin were not affected in our cohort like others (2,3,5,6,8). Few studies reported affection for the face & axilla (6,10), contrary to our study.

Follicles were present in lower leg in all cases with extension to thigh(24%) and forearm(1%) in present study, which is different from the study by Rama R. et al where extensions to thigh(22%),forearm(12%),beard area(7%),anterior chest(2%) were noted. The interval between onset of leg lesion and thigh is ranged from 6 months to 3 years.

The presence of follicles with both papules and pustules (96%) were common findings in the present study, although solo presentation (papules-3% and pustules-1%) was rare. This study is consistent

with Prasad P et (2) and Kaimal S. et al. (10), where follicles with both papules and pustules were present in 86% and 100% of cases, respectively. Saranya TM et al recorded presence of papules and pustules (n=38,76%), papules (n=8,16%), pustules (n=4,8%) in contrast to our study. However, all the studies agreed that the most common presentation is with papules and pustules. Nearly all the follicles in the affected area contain pustules, from the centre of which single hair could be seen to be emerging.

Pruritus (90%) was the most distressing symptom reported in the present study, which is nearly the same as that of other studies (2,8). Another Indian literature documented pruritus as a universal symptom (5). Severe burning sensation (25%), pain (9%), bleeding (2%), and eczematization (4%) were other features in our study, which is comparable to the study by Prasad et al. (2), whereas scaling was seen in 20% of cases, much higher than in other studies (2, 10).

Loss of hair following resolution of the lesion and mild atrophy of skin were seen in 78% and 30% of cases in this study which is at par with other literature (2,6,9).

Pus Culture and Sensitivity were done in 97 (97%) patients out of 100. Staphylococcus was the commonest organism isolated (80%-staph.aureus, 2%-coagulase-ve staphylococcus) in our study, similar to other studies (1,2,3,6,7,8,12,15,16). Beta-haemolytic Streptococcus (2%), Pseudomonas spp. (7%), Klebsiella (3%) were organisms isolated from pustules comparable to other studies (2,10).

Organisms isolated from pustules were sensitive to Amikacin (73%), Linezolid (70%), and Vancomycin (68%). Gentamycin (65%), Gatifloxacin (30%) and showed variable sensitivity to Erythromycin, Ciprofloxacin, Imipenem and Cephalosporin. This study is dissimilar to the study by Parikh et al., where staphylococcus showed the highest sensitivity to Erythromycin (97%), followed by Gentamycin (92%). Saranya TM et al., in their study, isolated staphylococcus aureus in 58.3% of cases and documented sensitivity to commonly prescribed all above antibiotics with resistance to penicillin (5). Recurrence was noted in 10% of cases within 1 year. And 30% within two years. At the beginning of treatment. Unavoidance of risk factors, humid tropical climate, and sticking to professions may be causes of recurrence.

Tertiary centre data do not precisely reflect the disease profile of the community. Admittedly, the present study is based on a limited number of cases and is inadequate to provide conclusive data. Therefore, it is considered as the limitation of the study.

CONCLUSION

Though a ubiquitous entity in tropical countries, chronic folliculitis of the leg has drawn very little attention from Dermatologists, research articles on this entity are limited. In addition, uncertain etiopathogenesis & confusing treatment protocol provides a broad scope for further study of this disease to reach a clear consensus regarding effective protocol. Hence in our opinion, a multicentric trial with a large sample size will throw more light on its distribution & geographical variation.

ETHICAL CONSIDERATION

The study was approved by the Institutional Research Ethics Committee, all recruited patients provided informed consent. The identity of the patients was coded.

CONFLICT OF INTEREST

Authors declare no conflict of interest

FUNDING

This was an observational study, no funding required.

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MINI-PCNL IN PEDIATRIC PATIENTS WITH LARGE RENAL STONES- A SAFETY DATA

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DOI:

10.38106/LMRJ.2022.4
.3-04

Received: 02.06.2022

Accepted: 21. 09.2022

Published: 30. 09.2022

ABSTRACT

Percutaneous Nephrolithotomy (PCNL) is a recent advancement in the management of urolithiasis, it has now become the gold standard. This study aimed to assess the safety of mini PCNL in pediatric patients with large renal stones. This cross-sectional study included pediatric patients (n=12) who underwent mini-PCNL. Age, gender, number of stones, size of stones, and position in the renal system were documented. The mean age of the patients in the study was 7.67 years. The stones ranged from 10 mm to 20 mm with a mean size of 10 mm. Complete clearance of stones was achieved in 83.7%. 16.7% had incomplete clearance with clinically insignificant residual stones (i.e. < 4mm) requiring no further treatment except follow-up. The major complication in our series was hydroperitoneum in one patient, which was identified and managed by placing the intraperitoneal drain. Patients were discharged from the hospital on or before 3rd post-operative day. The study concludes that Mini-PCNL method is effective, safe, and economical for the removal of renal calculi in the paediatric age group. Further large scale studies exploring methods to lessen its morbidity would be recommended specially in patients with renal stone complications like hydroperitoneum.

Key Words: MiniPCNL, Urolithiasis, Renal stone pediatric patients

INTRODUCTION

Urolithiasis are defined as the stones in the renal system / kidney. Regardless of age standardization, the incidence of urolithiasis has increased during the past few years with the recent rate of almost 9% per annum (1). The preventive measures and advancement in the management have not yet reduced incidence, neither related complication appears to be declined. The resultant complications of morbidity in all age groups and carries a significant economic burden as when they produce pain its an acute emergency and patients are devastated. Thus the cost of surgery and the days out of work produce both direct and indirect burden over economy(2, 3). Urolithiasis in children is also common, but the new surgical techniques are mainly directed to explore the outcome in adults.

Percutaneous nephrolithotomy (PCNL) has been introduced for large kidney stones and now being used as the gold standard treatment. The tools utilised have been miniaturised during the last 20 years to reduce surgical procedure-related morbidity such as standard PCNL and boost the effectiveness of

removal of the stone. Mini-percutaneous nephrolithotomy (mPCNL) was introduced to treat children with the added benefit of reduced blood loss. Given the low blood volume in children blood loss is the major and potentially lethal complication. Depending upon the track size i.e. 14Fr and 22Fr the procedure is termed as mini-perc, or mini-PCNL (mPCNL). However, clear demarcation of the size and names still not exist (4). The primary purpose of the procedure is to remove the stone with minimal complications, where removal of stone capacity should be similar to conventional PCNL, but the rate of complications per operative or post-operative must be inferior to the conventional procedure. The size of the tract has significant influence on the rate of complications both during surgery and post-operatively (5). On the other hand, small tract size may make the stone removal difficult and prolonged surgical procedure causing anaesthesia-related complications(6).

The increasing rate of paediatric patients with urolithiasis has diversified the management. Thus this study was conducted to evaluate the safety during procedure and immediate post-operative period to make clear guidelines and design signposts for surgeons so that morbidity and mortality can be reduced and patients with clear indications and minimal risk can be identified.

METHODS

A total of 12 pediatric patients were recruited in this study, their per-operative and post-operative data were collected and analyzed. These all patients underwent mPCNL at the Department of Urology, Liaquat University of Medical and Health sciences Jamshoro, Pakistan between July 2018 to October 2018. Patients included in the study were seen at urology clinic and planned for mPCNL. They were aged between 4 to 13 years with normal renal function and mean stone size was 10 mm. The patients were thoroughly examined with detailed history, physical examination and basic laboratory investigations, including complete blood count, blood urea and creatinine levels, serum electrolytes, urinary analysis including culture & sensitivity, ultrasound abdomen and pelvis, X-ray kidney, ureter, and bladder (KUB), and Computed Tomography (CT) scan-KUB (Figure 1 and 2).



Figure 1. Computed Tomography (CT): Kidney Ureters and Bladder (KUB)

The patients' age and gender were documented, as well as the size of stone was measured in mm, the number of stones were recorded as dichotomized variable i.e. single or multiple, hydronephrosis was looked at, site of stones in the kidney, (i.e. renal pelvis and different calyceal stones) was also documented. Tract access such as upper, middle or lower pole calyx puncture were also documented. The outcome of the procedure was measured in terms of stone clearance, whether it was complete or incomplete, and the decision was made on the basis of stone fragments seen on table fluoroscopy and post-operative X-ray KUB. Incomplete clearance was defined as any clinically inconsequential stone whereas, no residual stone were considered as complete clearance. On 1st postoperative day complications such as significant bleeding in Foley's catheter or nephrostomy tube requiring blood transfusion, rise in temperature more than 99 °F or pain requiring more than three doses of injectable pain killers were recorded.

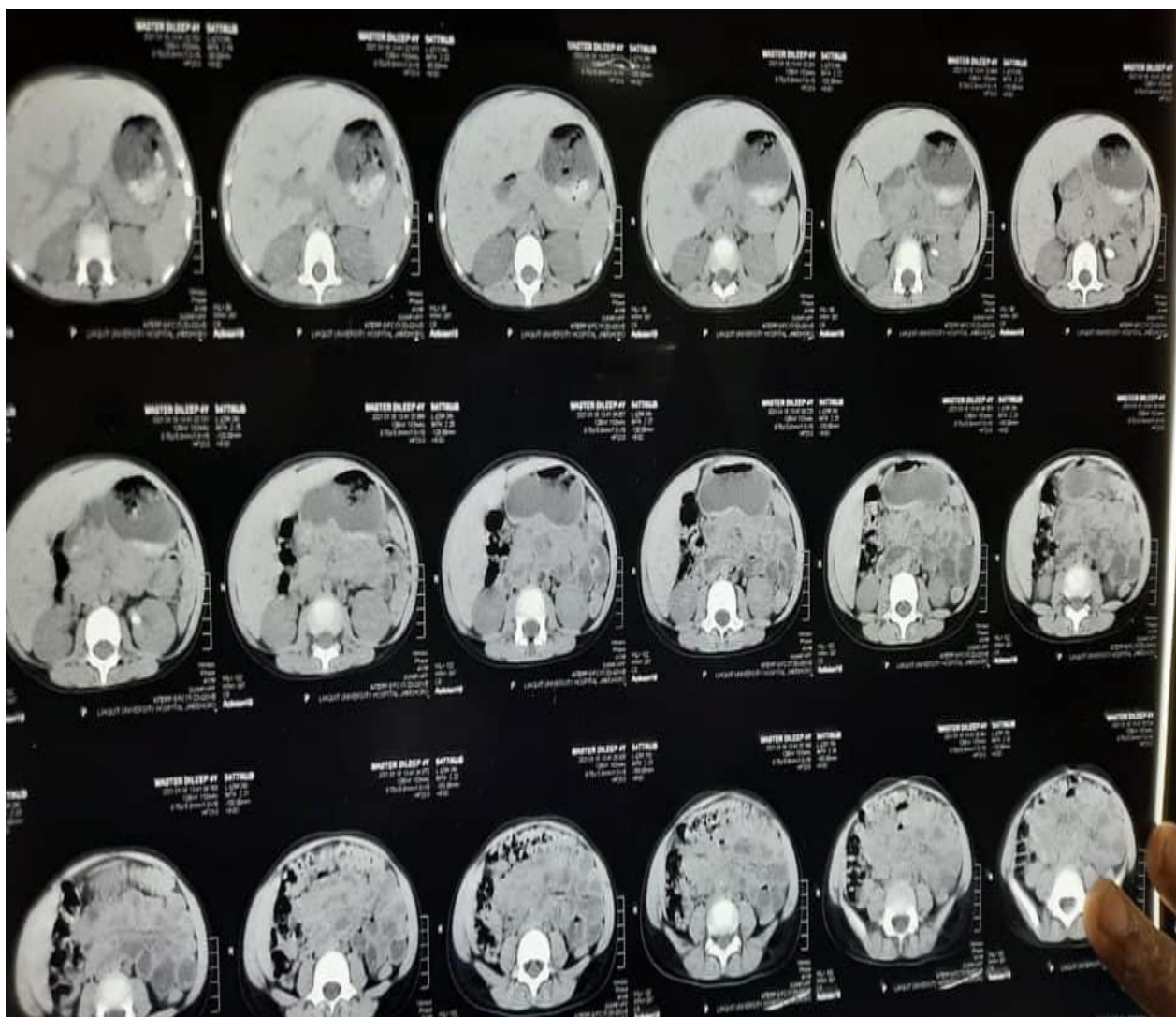


Figure 2. Computed Tomography (CT) Kidney Ureter and Bladder Showing left renal stone

The procedure was performed under general anesthesia in all patients. 10Fr pediatric cystoscope was used to get retrograde urography under the Fluoroscope in lithotomy position and open ended 3-5Fr ureteric catheter were placed and secured to a Foley's catheter. Mini-PCNL was done in prone

position. Punctures were made under Fluoroscopic guidance where ureteric catheters used to fill the system with contrast material. The contrast material is used for opacification of the system and distention of the collecting system (Figure 3). The urinary collecting system was accessed through lower calyx. Through out the procedure patients were maintained in prone position. The track was dilated over a suitable guide wire of up to 21Fr than the amplatz sheath of 22Fr was inserted through which Storz rigid nephroscope 18Fr was passed (Figure 4). Pneumatic probe was used for stone fragmentations, in all patients except one 16Fr Nephrostomy catheters were used. Only one patient required to be double punctured. Ante grade double J stenting was also done in selected patients at the end of the procedure. The Nephrostomy tube was left until the second postoperative day then it was removed, while the DJ stent was removed after two weeks, as per standard protocol. Procedure was successfully carried out in all patients with complete clearance of the calculi.



Figure 3. Left retrograde Pyelography (RGP) Figure 4. 22 Fr amplatz sheath is being placed

All patients were monitored for complications such as fever, pain and bleeding on the first postoperative day. All patients were healthy enough to be discharged on or before the third postoperative day.

The study's data was collected using Statistical Package for Social Sciences (SPSS version 22.0). Continues variables were summarized as mean and Standard Deviation (SD); i.e. age (in years) and stone size (in mm). Frequency distribution with percentages were calculated for categorical variables; i.e. gender, stone site, number of stones, presence of hydronephrosis, calyx puncture, clearance status of the stone and complications.

RESULTS

Twelve patients underwent mini percutaneous nephrolithotomy, the mean age of the patients was 7.67 years. Mean size of the renal stones was 10 mm with a range of 10–20 mm. Out of 12 patients, 7 (58.7%) were males and 5 (41.7.3%) were females. All patients had pelvic stones, in addition to pelvic stones 3 patients had lower pole stones. Different degree of hydronephrosis was observed, where five (41.7%) patients had mild and seven (58.3%) patients had moderate hydronephrosis. A preoperative antibiotic regimen was prescribed for five patients with positive urine cultures. Complete clearance of stone was achieved in 10 patients (83.7%) and 2 patients (16.7 %) had incomplete clearance, with clinically insignificant residual stones which were <4mm and were not required any auxillary

procedure. All patients had lower pole punctures to gain access to pelvi-calyx system, for which bull's eye technique was applied in 11 (97.7 %) patients and the triangulation technique in one (8.3%) patient. Only two patients had nephrostomies implanted; the others remained tubeless. Ante-grade DJ placement was done on 2 patients. The mean operative duration of the procedure was < 1.1hr.

The major complication was hydro-peritoneum in one patient who was recognized immediately in the operation room and managed by placing the intra-peritoneal drain. The haemoglobin level of one patient dropped as a result of intraoperative bleeding, requiring a blood transfusion, but the other patients experienced no serious complications. Three patients (25%) experienced moderate pain in the first 24 hours following surgery and needed injectable analgesics. Vomiting occurred in 8 patients (67%) and was treated with antiemetics.

DISCUSSION

Patients with renal stones treated with mPCNL and traditional PCNL experienced similar stone-free rates. However, with the small tracts, the risk of blood is significantly lower and the need for blood transfusion reduced to nominal or insignificant. Though it substantially raises the time duration of the procedure (7). On the other hand, there are reports presenting significantly shorter duration of the hospital stay with mPCNL compared to the conventional procedure (7). In the study published by Misra et al., they found that mean hospital stay after mPCNL was 1.5 days, but in this study we have found that most of the patients were discharged from the hospital within two days of the procedure. Only one patient required a longer hospital stay for more than 3 days secondary to complication of hydroperitoneum. Thus, it is suggested that mPCNL safe from a complication point of view, so it can be considered an effective evolution of the cPCNL technique. There are limited high level evidence which compares two procedures using same indications in children such as large Randomised clinical trials (RCTs), preferably multi-center trials. The carefully designed RCTs will certainly wash out selection bias and operating surgeon introduced bias. Because high level expertise in surgical procedures reduce the risk of complications anyway. The shorter hospital stay was previously reported in another series by Jackman et al, this has strongly supported our results (6). The stone clearance rate in children or adults as has been reported to be comparable at 85% when the stone size is measured between 12 to 15 mm. There were a few studies which however have shown inferior stone fragmentation in children with smaller instrument such as the series reported by Giusti et al (7). In our study complete stone clearance was achieved in 83.7 % of patients and 16.3 % of patients had incomplete clearance with clinically insignificant residual stones of < 4mm. This can be attributed to the size of the stone being removed. Though the small instrument has a limitation of removing very small stone, fragments must be made into very small pieces to fit in the narrower sheaths. This significantly raises the operating times, whereas during standard PCNL, relatively larger fragments can fit in the sheaths thus crushing into tiny bits is not essentially required allowing removal of large stone fragments by using forceps and baskets.

Minimizing invasiveness of the PCNL was driven from the concept of lower morbidity as compared to the conventional PCNL. The robust data in support of lower morbidity is still controversial, in order to confirm the findings Li et al (8) compared mPCNL and conventional protocol and measured acute-phase proteins. The study found no significant difference. Another experimental study was conducted using Pigs and compared renal parenchymal damage with the use of 11Fr versus 30 Fr nephrostomy tubes (9). The study showed no significant difference in the resultant were no detectable differences in the degree of damage and the resultant scar volumes. There are other studies which confirmed

small amount of blood loss in cases of mPCNL as compared to the conventional PCNL. A similar study by Mishra et al (10) reported a clinically significant advantage for using 18 Fr as compared to the 26 Fr.

The size of the stone as one of the indications of mPCNL and this is the crucial point. However, the data reported till date remains inconsistent regarding the indications thus the resultant stone fragmentation rate and the rate of complications among studies also differ. Though for small stones mPCNL has shown high effectiveness has been reported as compared to relatively larger renal stones i.e. 20 mm or bigger (9,11,12).

According to the Clavien-Dindo classification, the rate of complications ranges from 11.9% to 37.7% (11), out of which majority of complications were of low grade. These findings are consistent with our results where only one patient developed major complication of hydroperitoneum which was recognized immediately and managed conservatively. There was a prospective study to explore the hemodynamic, electrolytes, and metabolic changes and compared conventional versus mPCNL (12) and there was a trend of metabolic acidosis in patients undergoing mPCNL. These findings can be biologically explained by prolonged operating time associated with longer duration of anesthesia and given the smaller track size higher pressure intra renal irrigation is used.

This a small scale study from a single centre confirming safety of the procedure in children with minimal complications and there was low morbidity. The smaller sample size and non-randomized/ convenient sampling technique are considered the study's limitations. However large scale multicenter randomized controlled trials comparing conventional versus mPCNL in children need to be established to produce robust scientific evidence.

CONCLUSION

This small study indicates that mini PCNL may be an effective and safe procedure for removing renal calculi in the pediatric age group with less morbidity; however, there is a slight increased risk of longer intraoperative duration.

ETHICAL CONSIDERATION

The study was approved by local ethics committee; informed consent was taken from all the patients.

CONFLICT OF INTEREST

Authors declare no conflict of interest

FUNDING SOURCE

No funding was received for this project.

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EVALUATION OF PATTERN OF COMPUTER VISION SYNDROME DISORDERS IN YOUNG ADULTS – A CROSS-SECTIONAL STUDY

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DOI:

10.38106/LMRJ.2022.4.

3-05

Received: 28.06.2022

Accepted: 13. 09.2022

Published: 30. 09.2022

ABSTRACT

The study was designed to evaluate the pattern of computer vision syndrome disorders in young adults. All patients (n= 138, 74 males and 64 females) coming with complains of dry eyes, eye strain, burning eyes, redness, blurring and headache were included. These patients were aged between 18 to 35 years with at least 2 hours' exposure to any type of Visual Display Terminal (VDT). The mean age of the study population was 20.4 years. The majority of the study subjects were males, i.e. 74 (53.6%). Around 78.2% of study populations had refractive errors. Myopia was the most significant refractive error found in 53.6% of the study population. The prevalence of CVS in our study group was 89.1%, with headache as the most common symptom reported in 68.8%. Furthermore, 94.9% of participants were viewing the screen from a distance of 30 to 40cm and 81.9% of subjects were using VDTs at night in bad ergonomic conditions. These findings point to the height of the health issue, which needs to be addressed with clear instruction for the use of proper screen protections and safety time cut-offs for the use of computer screens

Key Words: Computer vision syndrome, Ergonomics, visual display units, ocular complaints

INTRODUCTION

Since the introduction of computers, several screen-related effects have been reported among long-term users and professionals. The group of these symptoms and signs is now termed as "Computer Vision Syndrome" (CVS) or digital eye strain. The American Optometric Association defines it as *a collection of eye and vision-related issues that emerge from extended computer, tablet, e-reader, and mobile phone use*(1). The syndrome is comprised of complaints including dry eyes, irritation causing redness, strain/fatigue in the eyes, blurring of vision, burning sensation, excessive tearing and double vision. Some patients also report having light sensitivity and headaches with digital eye strain. It is also reported that CVS is commonly occurs due to prolonged exposure to computer screen without proper light and in appropriate screen brightness. The suitability of the workstation layout is also important along with any pre-existing eye condition(2). Computer vision syndrome reportedly became the most common occupational hazard of this century resulting from technology development, affecting over two thirds of all the smart device users globally making it one of the most common public health issues in the world(3). The symptoms associated with CVS also cause decline in productivity at work,

rise in human errors, reduction in quality of work satisfaction, and decline in visual ability(4). Global statistics suggest around 60 million people are suffering from CVS, with a rise of one million new cases each year (5). The prevalence of VDT-related eye disorders varies greatly among studies, due to variation in the selection criteria, methodologies adopted for sample collection and research instrument used(6,7). In a review by Thomson et al. stated that ~90% of computer users may have symptoms associated with CVS after prolonged screen exposure. Another study reported from Abuja, Nigeria, had 40% of VDT users experiencing at least one symptom of CVS(8). While in Sri Lanka two-thirds of computer office workers suffer from CVS, according to the national research(9). A couple of studies were reported from Gondar, Ethiopia, where more than 70% of secretaries, data processors, and bankers, who mainly work on computers, are presenting with CVS(10,11). According to other studies, the frequency of CVS ranging from 75% to 90% among workers exposed to VDT during most of their working hours (12). The reported rate from Italy was 31% (n = 212), India 46% (n = 400), Australia 63% (n = 1000), and Spain 68% (n = 35) of computer use related visual symptoms(13–15). According to these studies, almost 75% of participants spending six to nine hours per day in front of screen, experience some degree of ocular discomfort. The difference in the rate of development of visual symptoms largely depends upon the number of samples they have included. There is little evidence showing that CVS symptoms cause lasting eye damage and vision impairment. There is also limited literature available from Pakistan. Given the rising use rate of computers in all offices, it is important to explore the rate of CVS in our population. This study aimed to discover the pattern of computer vision syndrome disorders in young adults, presenting at a single centre.

METHODS

This was a cross-sectional study conducted at Al-Ibrahim eye hospital, Karachi, Pakistan, for 6 months (April to December 2020). The patients presenting with complaints of eye strain, dry eyes, blurred vision, burning eyes, and headache, aged between 18 to 35 years, and at least 2 hours of exposure to any sort of VDT, were included using a non-probability convenient sampling technique. Patients with uncorrected refractive errors, convergence insufficiency, fundus pathology, medication effects, and mentally retarded patients were excluded. Informed consent was taken from all patients, when they agreed to be part of the study data was collected using a pre-designed questionnaire. Statistical analysis was done by using Statistical Package for Social Science (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp). All the continuous variables were presented as mean and standard deviation (\pm SD) and all categorical variables were presented as frequency and percentage.

RESULTS

Mean age of the patients was 20.4 years. Gender wise distribution showed that 74 (53.6%) were males and 64 (46.4%) were females. Around 78.2% of study populations had refractive errors. Myopia was the most significant refractive error in 53.6% of the study population. Among study population, 34.8% were using electronic gadgets for 3 to 5 hours. The prevalence of CVS was found to be 89.1%. Headache was the most prevalent symptom (68.8%). The screen was viewed by 94.9 % of participants at a distance of 30 to 40cm. In poor ergonomic settings, 81.9 % of the subjects used VDTs at night. A summary of the types of refractive errors reported in the study is given in Table 1.

Table 1. Distribution of type of Refractive Error reported in the study population

Refractive Error	Frequency	Percent
Myope	74	53.6
Hypermetropia	7	5.1
Astigmatism	27	19.6
Emmetropia	30	21.7
Total	138	100.0

DISCUSSION

The mean age of our study sample was 20 years, and most males were reported to have CVS symptoms. The findings of our study were consistent with a study reported from Saudi Arabia including students and stated 21.4 ± 1.9 years mean age and that three-fourth population suffering from CVS were males. It is though interesting that younger males are complaining of the screen related issues. It is also in line with the pattern of social system where males work more in offices and in front of computer screens than females.

In our study, a higher rate of refractive errors were observed (i.e. 78.2%) compared to the previously reported study by Margareta C et al where it was reported to be 55.6%. This might have influence of the sample type included in the study. This might also have an association with the make-up and quality of screens used(16). As we did not include the type of monitors of computer screens thus it is difficult to make exact correlation. Our study reported that a considerable number of participants use electronic devices around five hours a day for a minimum of three hours. These findings are in line with the previously reported study by Zairina et al where 42.9% of the study population was using computer around 5 hours per day. While these findings contradict a report from Delhi, India where great majority was using screens six to nine hours a day, 26% of the study population stated to spend more than nine hours a day on the computer(17).

Overall it was found that 89% of patients reported in our centre had computer related ocular issues which fall under computer vision syndrome among young adults. The rate reported in our study was a little higher than the number seen in a study by Pulla A et al, where it was reported to be 60.3%. Again, this seems to be influenced by the type of sample selected for the study and the way of data collection and also here is also a chance of recall bias from the participants.

The most common symptom reported in our study was headache (68.8%), then eye strain or fatigue (i.e. 46.2%), while half of the study population had watery eyes, another 15% and 20% had redness and blurring respectively. These findings are comparable to the study by Talwar et al where 76% of the study population had visual symptoms with computer use and most common was watering of eyes, pain and irritation, burning and redness, blurred vision and headache. There was another study reported from Malaysia, which also reported headache and eye strain as the most frequently presenting features after use of computer screens.

The study has highlighted an important occupational and general health issue in public, particularly working class of our population. Where the use of computers resulting in ocular problems. The study has not explored the exact duration of the used of screens also the use mobile phone screen was not particularly individualized, are the limitation of the study. The make of computer monitors is also an important aspect that was not included in this study, as it was beyond the project's scope.

CONCLUSION

The majority of young adults using computers at the workplace nowadays, thus, this study has reported a considerable number of young adults suffering from Computer vision syndrome. Further studies are required to find significantly influencing factors and develop strategies to control this major ocular problem.

ETHICAL APPROVAL

The study was approved by the institutional review board/ethical review board. (REC/IPIO/2020/008)

CONFLICT OF INTEREST

Authors declared no conflicts of interest

FUNDING SOURCE

No funding required.

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RISE IN MOBILE GADGETS USE FOR SCHOOL LEARNING AND HEALTH ISSUE OF CHILDREN- LONG-TERM SEQUELAE OF COVID-19 PANDEMIC

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DOI:

10.38106/LMRJ.2022.4.3-06

Received: 26.08.2022

Accepted: 16. 09.2022

Published: 30. 09.2022

ABSTRACT

COVID-19 pandemic has brought a paradigm shift in education with a trend of online learning and even schooling. During complete lockdown period schools were shifted to smartphones and computers. This study aimed to explore the pattern of smartphone use before and after the COVID-19 pandemic and the health issues of school-going children in post-COVID-19 period. There was a significant rise in the timings of mobile phone use from 2 hours to 7 hours per day. A total of 90% of student's mothers reported behavioral change where lack of socializing was the most commonly reported change. Irritation of eyes and dryness were the most commonly reported ocular disorders. The rise of mobile phones has brought several behavioral and ocular disorders due to long hours of use. There is a need to confirm health-related issues of smartphone use in large prospective studies and develop preventive strategies.

Key Words: Smartphone use, ocular disorders in children, behavioural disorders in children

INTRODUCTION

COVID- 19 pandemic started in November 2019, caused by SAR-2 Virus, reported for the first time from Wuhan, China, followed by the devastating spread worldwide resulting in global pandemic. The pandemic has changed the world, business, economy, science, and education(1). Due to pandemic, the world was shut down for a long time, including schools. Given the indefinite closure period, the education system moved towards work from home and online education. All physical working hours were spent in front of computers and smart phones. The children were greatly hit by the virus, where their education was stopped until the start of online education. All schools were shut for over a year during pandemic worldwide. The majority of students used laptops or mobile phones for online learning, a small proportion of children used desktops, where Italian study reported more than 97% of children getting distant learning by using smartphones(2). The online classes timings vary from four to six hours. This means the students remained in front of smart phone or laptop screens for this time. Followed by homework and sending it online further raised duration of exposure. A study from British Columbia suggested a significant rise from mean 6 hours to mean 8 hours per day of mobile

phone use in pre-COVID to post-COVID, respectively(3). Another study focusing on University undergraduate students reported more than 65% of mobile phone addiction prevalence during COVID-19 Quarantine period(4). An Indian study including 122 individuals reported that young adults aged 15 to 30 were badly affected by the hype in the use of mobile phones and detrimental effects on health(5). The life of children in play group and older without an exception were badly affected(6). There is limited literature available on exploring the impact of longer duration of smart screen exposure and effects on health of the school children. Therefore, this study was conducted to evaluate the rise of the exposure hours and its association with ocular health and mental health.

METHODS

This was a prospective observational study including parents of school going children. The study was conducted population-based. Students studying in class four and above were included. Parents with at least one child attending school were requested to be part of the study. The parents were requested to respond to the questionnaire separately for each child if they had more than one child. The questionnaire had three parts, first asking about age and gender, followed by average use of hours per day of smartphone screens before COVID-19 pandemic and online education. Then post COVID-19 use of mobile per day averagely. In the second part the parents were asked regarding eye symptoms or signs of recent onset in their children. Section three asked questions regarding behavioral change in the recent past (i.e. post-COVID-19). They were also asked about sleeping disturbances. The data was analyzed by using Statistical Package for the Social Sciences (SPSS), version 22.0 (IBM Corp., Armonk, New York). A p-value <0.05 was considered significant.

RESULTS

A total of 256 parents were included, with 300 children. The mean age of the children was 9.95 years (range 7 to 15 years). There was a significant rise in the use of mobile phone / smartphones or tablets per day ($p < 0.001$), which has risen from the mean of 2 hours per day to the mean of 7 hours per day (Figure 1). There was a change in the sleeping pattern of the children (Figure 2). Ocular symptoms were reported in 91% of children, which ranged from dryness, irritation to change in the vision and use of glasses. A summary of the ocular symptoms is presented in Table 1. Behavioural change was observed in 90% of children and lack of socialization was most commonly reported (i.e. 26%), a summary of behavioural change is presented in Table 1. There was a significant association of behavioural change with increased hours of mobile change (p -value = 0.02).

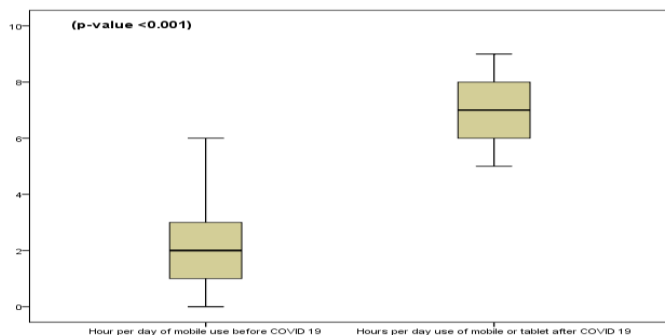


Figure 1. Hours of mobile phone use per day in school going children pre and post COVID-19

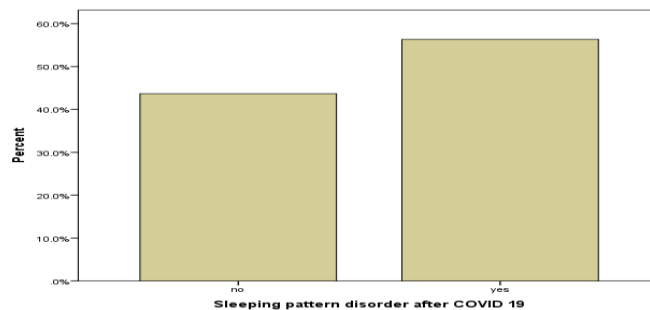


Figure 2. Reported change in sleeping pattern of children in post-COVID-19 period

Table 1. Pattern of ocular and behavioural disorders in children using smartphone

Ocular disorders		Behavioural disorders	
Disorder	N (%)	Disorder	N (%)
Dry eyes	106 (35.3)	Lack of interest in socialization	78 (26)
Irritation	79(26.3)	Lack of interest in real life	52 (17.3)
Change in vision	54 (18)	Irritability	52 (17.3)
Spectacular use	34 (11.3)	Tiredness	47 (15.7)
No change	27 (9.0)	Anger	39 (13.0)
		No change	32 (10.7)

DISCUSSION

The study showed a significant rise in the mobile use after COVID-19 pandemic among school going children, which has badly affected their sleeping pattern, ocular health and behaviour. There are studies available reported on longer hours of mobile phone use in children and adults, where there is significant rise in post-COVID 19 period(3). In one study the use of smart phones during quarantine period was the source of satisfaction and alleviation of loneliness(7). The use of smartphones increased not only for education but also for the awareness of masses regarding the disease. During the period of quarantine public awareness and also communication with patients was easier through health application on mobile phones, in such ways mobile phone use made considerable contribution(8).

Telemedicine became the most important part of the health care delivery system during COVID-19 pandemic(9). The use of telemedicine, even after COVID-19 continue to benefit the deprived population. Thus, it has a great potential to strengthen healthcare system further. On one hand, it was helpful during the pandemic, but the use of smartphones in most places has remained an addiction. Children of school-going age are particularly vulnerable in this situation. It was also feared at the beginning of the pandemic(10). Since it is known that the mobile phones emit radiation that gets absorbed in the human tissues. The absorption of the radiation is directly proportional to the time used on mobile phone. International Agency for Research on Cancer (IACR) in 2011 raised suspicion of mobile radiation to be carcinogenic(11). However, it is long term effect and post- pandemic rise in particular cancers especially brain tumours and correlating with the mobile use will take time to be proven. In addition to these long term risks, prolonged smartphone use has been reportedly associated with cognitive disorders, issues in socializing, shyness, disorders of eating habits and musculoskeletal issues due to particular posture and lack of physical activity(12).

Our study has also confirmed short-term complications related to smartphone use, including reduced socializing and lack of interest in real life. These can probably lead to cognitive disorders in long term. The study has included young children and their parents were asked about the disorders, thus there is a chance of information bias. Also parents themselves encourage use of mobile phones

when the child gets irritated. Thus information regarding social behaviour is difficult to assess. Therefore we consider it as a limitation of our study. A long term prospective study with evaluation of academic performance at school and at the same time evaluation from parents and teachers is suggested.

CONCLUSION

The study concludes that there has been a significant rise in the use of mobile phones in school-going children post-COVID-19 pandemic. There have been health implications on the ocular health as well as on the behaviour of the children.

ETHICAL CONSIDERATION

All recruited parents provided informed consent. The identity of the participants was coded.

CONFLICT OF INTEREST

Authors declare no conflict of interest

FUNDING

This was an observational study, no funding required.

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USE OF RIGID, FIXED BRAIN RETRACTORS IS HARMFUL FOR THE BRAIN

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DOI:

10.38106/LMRJ.2022.4.3-
07

Received: 28.06.2022

Accepted: 13. 09.2022

Published: 30. 09.2022

ABSTRACT

While operating upon the brain, deep seated lesions need to be approached by using retractor's system, due to the soft and gelatinous nature of the brain. Using a conventional rigid, fixed retractor system for brain retraction appears harmful. As an alternative Thudicam Nasal Speculum (TNS) retractors can be used. This study was aimed to explore the outcome of TNS retractors in brain surgery. The cross-sectional study was conducted at Ziauddin University hospital north campus and National Medical Center Defense, Karachi, Pakistan, during a period between August 2019 to March 2020. A total of 60 patients were included (42 males and 18 females), with a median age of 25 years. In all these cases intra-cranial hematoma were removed with unremarkable damage, in aneurysm clipping it was found useful, without damaging adjacent areas and extraction of brain tumors was found to be very easy and non-damaging to the surrounding brain tissue. Patients had a follow-up period of about 03 months and contusion, ischemia or brain edema was not present in any patient. Only one patient died during second month after surgery due to Ischemic stroke of contra-lateral MCA. The study concludes that using TNS retractors was very helpful and non-damaging to the brain.

Key Words: Brain Retractors, Brain injury, Neurosurgical procedures

INTRODUCTION

The iatrogenic injuries caused by brain retractors are consequences of neurosurgical procedures, however, the advent of newer retractors has improved surgeons comfort in the visibility of the lesions, procedural ease and minimal brain injury (1-5). Deep brain lesions such as tumors, aneurysms, intra-cranial hematoma and intraventricular tumors, are difficult to approach without retraction, and at the same time if microscope or endoscope is to be used it becomes even tougher to avoid any damage to the falling brain (1,5, 6). A study by Butt et al has found a 33.33% to 66.66% rate of brain edema observed in excision to debulking procedures of brain tumors (7) causing further hindrance in approaching the operating field (3). In situations like these, use of rigid, fixed retractor can cause brain contusion or ischemia to the brain, sometimes postoperative bleeding and hematoma (6.7%) may occur under the retracted area of the brain (8). Moreover, glare of light from the rigid fixed retractor while using headlight is another disadvantage which one has to overcome by certain adaptations (4).

Fixed rigid retractor systems are very expensive leading to further rise in the surgery cost. In contrast, the use of Thudicam Nasal Speculum (TNS) retractors is far safer, due to its low weight, soft prongs

and malleable blades, which reduces the risk of post-operative bleeding, infarct, contusion or edema. The TNS retractors are available in different sizes. Due to these sizes, lesions at different depths become easily accessible without any harm to the brain and with a smaller cortisectomy (10). Shiparo et al in a review of current studies, found that evacuation of hematoma and total resections and subtotal resections of tumors, the rate of complications was 2.8% at short term postoperative period(6). Another study by Lim et al has found good surgical outcomes with using brain retractors in tumor removal (10-12). However, there was limited literature available for different procedures. Therefore, this study was conducted to explore post-operative outcome following use of TNS retractors for different brain procedures.

METHODS

This cross-sectional study was conducted on 60 patients without any age or gender restriction. The cases were prospectively studied and followed-up. The study was conducted at Zia ud Din University Hospital north campus and National Medical Center Defense, Karachi, Pakistan during a period of eight months from August 2019 to March 2020. Before surgery, a written informed consent was taken regarding surgical technique from patients (GCS 15/15) or their relatives. Different types of TNS retractors were used for different depths of lesions, for deep lesions small modifications were made in the soft and malleable long blades of TNS retractors, the lower ends were bent so the blades became more widened for the extractions of lesions, without causing any damage to the normal surrounding brain tissue. All patients had Computed Tomography (CT) scan of the head postoperatively (Figure 1).

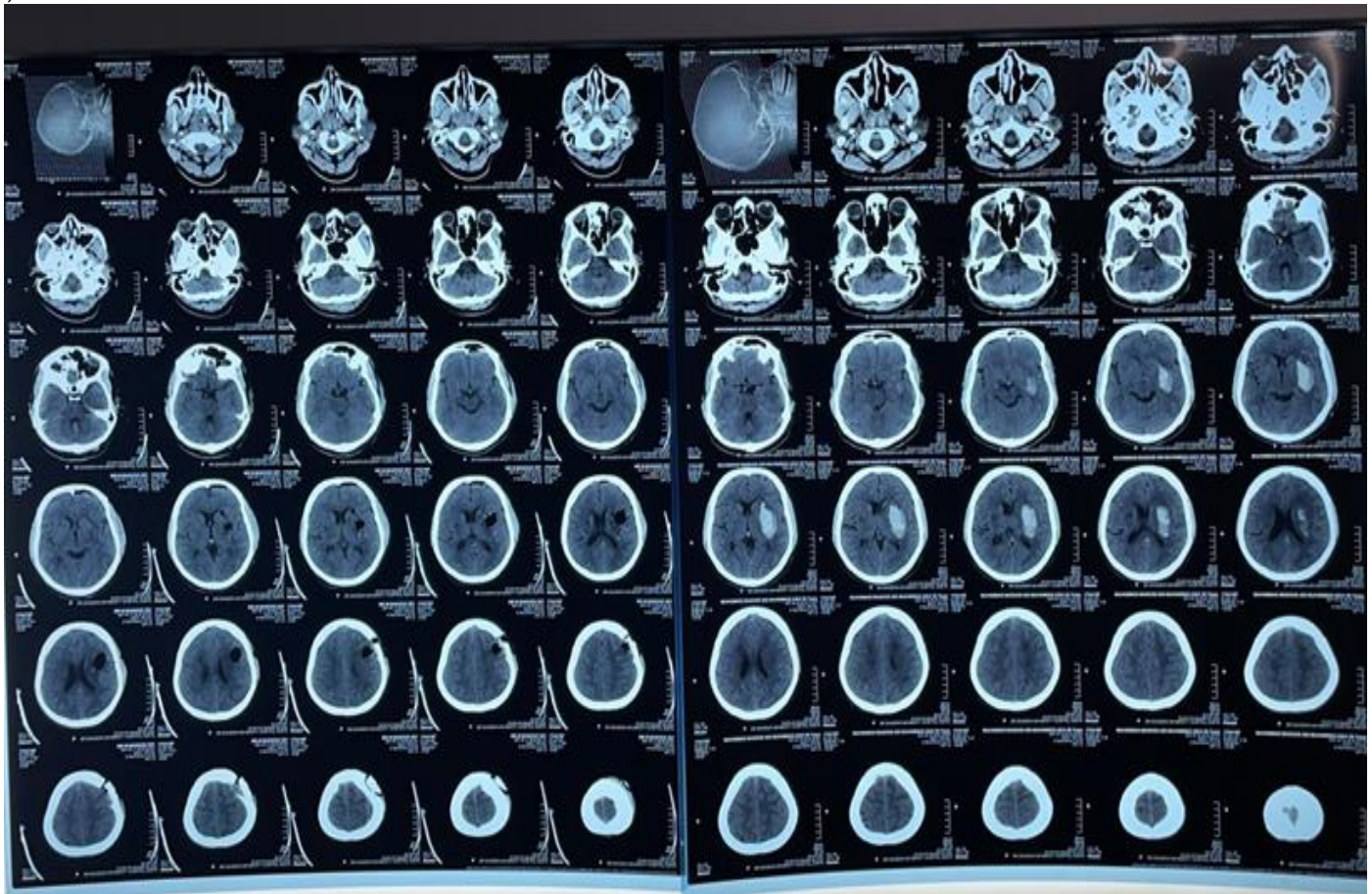


Figure 1. Computed Tomography (CT) scan of the patient after surgery

TECHNIQUE:

All surgical procedures were performed under general anesthesia using standard sterilization techniques, skin incisions were marked using standard brain mapping technique and linear, rounded or horse shoe-shaped incisions were made according to the needs. Osteoblastic or Osteoclastic bone flaps raised, dura was opened by linear incision, after a small cortisectomy lesion was identified and depth was measured with the help of Codman Dandy ventricular needle. Depending on the depths of the lesions, different sizes of TNS retractors were used. TNS retractors were very helpful using headlight, microscope, or endoscope. No glare of light, no brain trauma, even at edematous brain were observed.

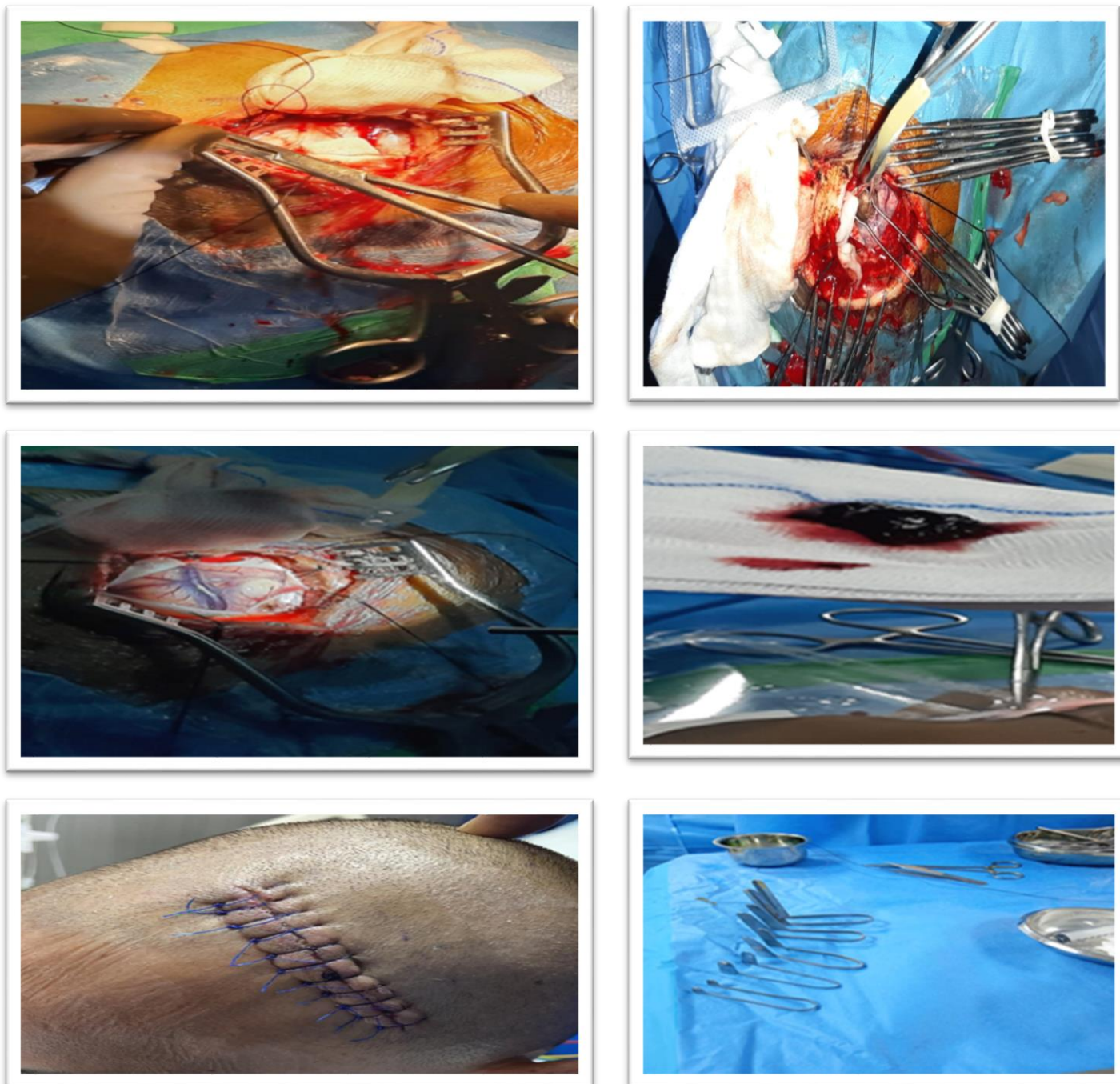


Figure 2. Surgical procedure showing use of retractors

RESULTS

There were 60 patients with a median age of 25 years, where 17.5% were below or equal to 10 years of age, 47.5% were between 11 to 30 years, and 35% were above 30 years of age. There were 42 males and 18 females. All surgical procedures were performed without any immediate complications. In cases of intra-cranial bleeding almost 100% of hematoma were removed, aneurysm clipping was done without any event per operatively, extraction of brain tumors was also done without causing any damage to the surrounding normal brain tissue. Median follow-up of the patients was three months, no remarkable post-operative contusion, ischemia or brain edema were reported. One patient died of ischemic stroke of contralateral MCA second month post-operatively.

DISCUSSION

Iatrogenic brain retraction injuries occur in around 10% of major procedures of cranial tumors and 5% of intracerebral aneurysms as previously reported (11-15). These injuries may range from mild edema to severe edema even contributing to mortality. However, with advent of newer techniques and modern retractors this can be minimized (16-20). In our study, with the use of TNS retractors there were almost no postoperative complications.

In some difficult surgical lesions there is a need of rigid retractors i.e. 5.7% in the study reported by Nazim et al (15). Rigid fixed retractors hide the normal anatomy, moreover in longer procedures like resection of brain tumors or clipping an aneurysm, prolonged application of rigid fixed brain retractors can cause contusion, ischemia or edema to the surrounding brain tissue that may result in irreversible brain damage. The Cochrane Systematic Review however, has concluded that there is no significant difference in the complications rate by using different types of retractors(3). On the contrary, the use of TNS retractors was found to be very helpful and non-damaging to the brain. TNS retractors can be applied in all those procedures involving headlight, microscope or telescope. Safronova et al found favourable postoperative results in deep brain injuries and tumor excision by combining microsurgical technique, craniotomy and retractors of tubular variety (11). Deep or shallow lesions are easily resectable. A small incision of 2 to 3 mm is needed on the cortex of the normal brain to reach the deep lesions. According to the depth of the lesions, different sizes of TNS retractors were available, the prongs and blades of TNS retractors were found pulsating with the brain leaving no contusion, edema or ischemia to the surrounding normal brain tissue. The simple TNS retractors have made the surgical approach to deep brain lesions of the brain, very safe, cheap and time-saving. The study has shown remarkable results with almost no complications. However, small sample size and short follow-up of the patients are considered as the limitations of the study. Surgical expertise of the operating team can also influence results in this kind of studies. Nevertheless prospective nature of this study is considered as the strength of the study.

CONCLUSION

In our study TNS retractors were found to be very helpful and non-damaging to the brain and can be applied in all those procedures involving headlight, microscope or telescope. Deep or shallow lesions are easily resectable. However, large cohort studies are required to confirm long-term effects.

ETHICAL CONSIDERATION

The study was approved by local ethics committee, all patients or their relatives provided informed consent before the surgical procedure. The identity of the patients was not disclosed.

CONFLICT OF INTEREST

Authors declare no conflict of interest

FUNDING

This was an observational study, no funding required.

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PRIMARY ENTEROLITH AND JEJUNAL DIVERTICULA CAUSING SMALL BOWEL OBSTRUCTION- A CASE REPORT

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DOI: 10.38106/LMRJ.2022.4.3-08

Received: 01.08.2022

Accepted: 29. 08.2022

Published: 30. 09.2022

ABSTRACT

Small bowel obstruction secondary to gallstone ileus accounts for about 0.3% to 0.5 % of all patients with gallstone disease. Formation of primary intestinal stones causing obstruction and requiring laparotomy is very rare, and the presence of the diverticula adjacent to the stone precipitating in the stone formation is a rare phenomenon. A rare case of primary enterolith and jejunal diverticula is presented here. An older women presented with small bowel obstruction found to have dual pathology; operated for removal of stone and had uneventful recovery.

Key Words: Primary enterolith, Jejunal Diverticula, Small bowel obstruction

INTRODUCTION

Gallstone ileus, most commonly caused by fistulation of the gallstone through duodenum or stomach, accounts for 0.3% to 0.5 % of all cases with known gallstone disease(1). The syndromes, which are well known to cause gallstone ileus, are either Bouveret's syndrome (i.e. seen in 0.5%) or Mirizzi's syndrome (i.e. reported in 1%). De novo formation of an enterolith is a rare phenomenon(2). One of precipitating factors could be small bowel diverticula which can act as a nidus.

CASE REPORT

An elderly female patient aged 83 years was brought to the Accident and Emergency department with a history of severe colicky abdominal pain and bilious vomiting for 24 hours. The patient mentioned having intermittent lower abdominal crampy pain and a reduced appetite for the last three weeks. She was a known case of diabetes, hypertension, back pain and gastroesophageal reflux disease (GORD), for which she was on various medications. She had a laparoscopic cholecystectomy 30 years ago and an open appendicectomy 60 years ago.

On examination, she was dehydrated. Her other general physical findings were within normal limits. Her cardiovascular and respiratory examination was unremarkable. Her abdomen was soft with mild distension and tenderness in the lower abdomen with guarding. She had normal bowel sounds on auscultation. Her blood tests were within normal limits, C-reactive protein level was mildly elevated white cell count was 13,000. Urea and creatinine were slightly elevated at 10.8mmol/L and 96µmol/L

respectively. A Computed Tomography (CT) scan of abdomen with contrast was performed to detect the cause of small bowel obstruction (Figure 1a and 1b).

The CT scan demonstrated a few scattered small bowel diverticula especially in the jejunum. It also showed fluid-filled dilated small bowel loops, more prominent in the lower abdomen where there was some mesenteric fat stranding. Within the mid ileum an intraluminal gas surrounding the structures was seen, resulting in the mechanical small bowel obstruction, and this was found to be a primary enterolith. Scattered colonic diverticula were seen on the CT, but no sign of acute diverticulitis was observed.

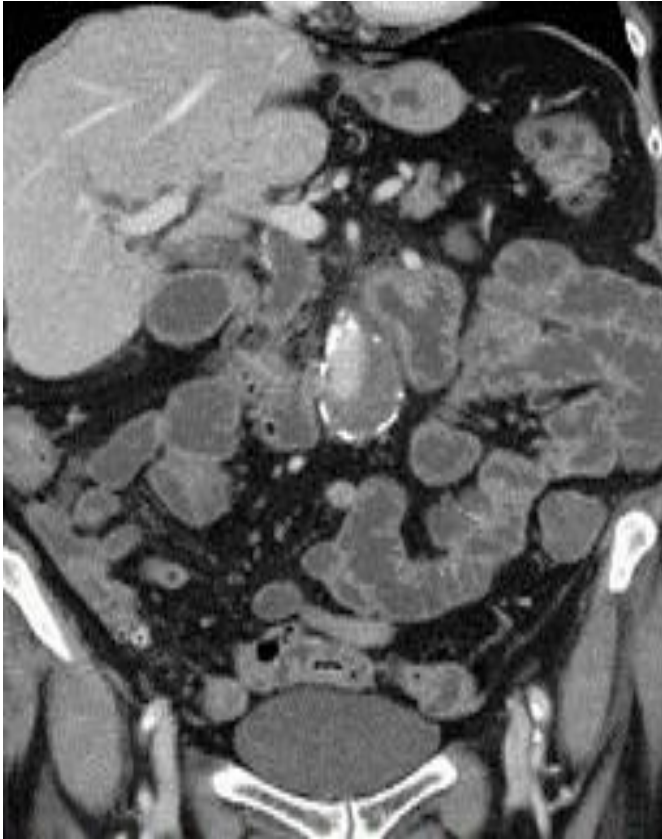


Figure 1a. Coronal view of computerised tomography of abdomen showing enterolith causing obstruction



Figure 1b. Sagittal view of computerised tomography of abdomen showing small bowel obstruction

The patient was admitted and initially treated conservatively with intravenous fluids, adequate pain management and a nasogastric (NG) intubation and nil by mouth. The NG tube drained bilious fluid of around 1.5L in the first 24 hours. However, the patient's symptoms failed to settle with conservative management as large amounts of bilious fluid continued to be draining through the NG tube. The patient was discussed, consented and prepared for a laparotomy, enterotomy and removal of enterolith. Her preoperative morbidity risk was 48.8%, with a mortality risk of around 2.9%.

With a lower midline incision, laparotomy was performed. Laparotomy findings were consistent with CT scan findings, and multiple diverticula on the mesenteric border of the jejunum were confirmed. More importantly, a 4 cm enterolith was palpable at the mid-ileum, causing small bowel obstruction. The bowel proximal to enterolith was dilated and thickened. There were minimal omental adhesions to the site of the obstruction and to the caecum and the lateral abdominal wall, which were divided. Transverse enterotomy was performed in the mid ileum over the mass and the

enterolith was extracted (Figure 2a, 2b, 2c and 2d). The enterotomy was closed in 2 layers with 3.0 PDS (interrupted and then burying continuous sutures). The remaining bowel lumen was inspected to ensure no strictures or other pathology.

The patient was managed in the surgical high dependency unit post-operatively for a day, then stepped down to the ward. The patient made an uneventful recovery apart from the ileus for short period of time.



Figure 2a. Intraoperative handling of enterolith



Figure 2b. Enterotomy for enterolith delivery



Figure 2c. Dimensions of delivered enterolith



Figure 2d. Jejunal diverticula found preoperatively

DISCUSSION

A diverticulum is a weakness or out pouching of wall of any portion of the gastrointestinal tract involving all layers. Diverticulosis (the presence of diverticula) typically affects the large intestine. These classically form where the mucosa and submucosa herniate into the muscle layer at junctions where mesenteric vessels penetrate the muscularis layer exposing an area of weakness. Small intestine diverticular disease is relatively less common as compared to the diverticular disease in the colon(3). These diverticula are believed to develop as a result of abnormalities in intestinal peristalsis, intestinal

dyskinesia and high intraluminal pressure. Unlike Meckel's diverticula, small intestinal diverticula are acquired and they become more common with advancing age.

Diverticula of the small intestine are usually asymptomatic with the exception of Meckel's diverticula. However, they sometimes do have major complications. These include repeated episodes of diverticulitis, gastrointestinal haemorrhage or obstruction, perforation, pancreatic or biliary (in the case of duodenal diverticula) disease, localised abscess, volvulus and bacterial overgrowth(4).

The duodenum is the most frequent site of small bowel diverticulosis, followed by the jejunum and the ileum, with an incidence of 60–70%, 20–25% and 5–10%, respectively(5). Most duodenal diverticula are found in patients aged >50 years whereas jejuno-ileal diverticula seem more prevalent in male patients aged 60-70 years(2).

Enteroliths are hard solid masses of mixed constitution formed in the gastrointestinal tract. Chomelin J, a French physician, first described these back in the early 18th century as a peculiar case of stone formation in a duodenal diverticulum discovered at autopsy. Enteroliths are classified into true (formed within the gastrointestinal tract) and false (formed outside the gastrointestinal tract e.g. gallstone ileus)(6). Stasis within the bowel is believed to be the most important factor contributing to their growth. Hypomotility of the bowel and an acidic pH shift due to chyme produce a microenvironment within a diverticulum, allowing conjugation and aggregation of bile salts to form stones. Enteroliths can also be formed due to other causes including Meckel's diverticulum, intussusception, gastrointestinal strictures, small bowel anastomosis, inflammatory bowel disease or even certain metabolic conditions. Small stones typically would pass down but large ones may cause obstruction.

This is called 'enterolith ileus' and is similar to gallstone ileus (4,6–8). This phenomenon has only occasionally been reported in the surgical, gastroenterology or radiology literature, given that many clinicians/ surgeons are still unaware of this condition resulting in delayed diagnosis. Therefore, it is of utmost importance to consider this in patients presenting with intestinal obstruction.

CONCLUSION

Jejunal diverticula leading to primary enterolith ileus is an extraordinary and rare diagnosis, which is usually indistinguishable from other causes of mechanical small bowel obstruction. However, acquiring knowledge about the complications of small bowel diverticula can assist in diagnosis. Enterolith ileus could be expected in the elderly population where common causes of intestinal obstruction have already been ruled out. It requires surgical management as enterolith ileus rarely responds to conservative management.

ETHICAL CONSIDERATION

The patient consented for this case report

CONFLICT OF INTEREST

Authors declare no conflict of interest

FUNDING

No funding required

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