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MANAGEMENT OF FOREIGN BODIES IN SOFT TISSUES PRESENTED AT ACCIDENT & EMERGENCY DEPARTMENT OF A TERTIARY CARE HOSPITAL

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ABSTRACT

Objectives: To know the management of foreign bodies in soft tissues of the body.

Material and Methods: Study was conducted in Khyber Teaching Hospital from January 2010 to December 2014. All cases confirmed to have foreign bodies in soft tissue were included. Exploration for removal was performed in Casualty under Local anesthesia. Name, gender, time since injury, type of foreign body, region of body, detection of foreign body on X-ray and removal were all recorded.

Results: Total 113 cases, 74(65.5%) male and 39 (34.5%) female were observed in five years. Mean age was 26.85±1.35 years. Fifty nine (52.2%) cases presented within 24 hours. Sewing needles 25(22.1%) and bullets/pellets 25(22.1%) were commonest followed by glass 22(19.46%), metallic fragments 21(18.5%), wood etc 10(8.84%), rubber/plastic 4(3.53%) and others 6(5.3%). Extremities were involved in two third of cases. X-rays were done in 102(90.3%) cases; foreign body was visible on X-Ray in 82(80.4%) cases. Nine cases(7.96%) needed aid of image intensifier for preoperative localization and 5(4.42%) needed General anesthesia.

Conclusions: Foreign body embedded in soft tissue is challenging in management and at times may need image intensifier and general anesthesia for removal.

Key Words: Foreign body, Needle, Bullets, glass, soft tissue, Injury, extremity.

INTRODUCTION

Foreign bodies may enter the human body through natural orifices or through skin by penetration[1]. Foreign bodies in soft tissues due to puncture wounds are common but infrequently reported in literature[2]. Soft tissue foreign bodies present earlier if symptomatic but may remain undetected for prolong periods, if asymptomatic[2]. These foreign bodies may be detected incidentally on radiographs or may present later with granulomas, abscess, non-healing sinus, lump or stinging sensation[3]. Foreign bodies missed on initial presentation may lead to medical litigation[4] against the primary physician. The foreign body may present away from the site of initial wound due to delayed migration within soft tissue planes[2,5].

The peripheries especially the hands are most vulnerable for puncture wounds and retained foreign bodies due to their exposure to trauma during manual work[6]. Foreign bodies in lower limbs and buttock are common and challenging in terms of management[7]. The common materials reported in literature are needles, pellets, bullets, iron spits, glass, wood, bones, stones, marbles and plastic[1,4,7]. Mostly these are radio opaque but wood and plastic are radio lucent while glass visibility on conventional radiography is erratic[3,8]. The foreign body on initial presentation may be visible or palpable in a puncture or perforating wound[8-10]. In all puncture wounds the foreign body should be suspected on the basis of history like needle puncture, glass injury, shot gun injury etc. Radiography and Ultrasonography are two basic adjuncts in detection of suspected foreign bodies[11-16]. Attempts at removal without proper investigation and preparation may lead to failure.

We frequently receive patients with retained foreign bodies in fresh wounds as well as embedded deep in healed wounds. The study was planned to share our experience and compare it with contemporary reports to identify the needs for improvement.

MATERIAL AND METHODS

The study was conducted in Khyber Teaching Hospital, Peshawar from January 2010 to December 2014. Ethical approval was obtained from the Ethical committee of Khyber Medical Institute. It was a de-

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scriptive cross sectional study. All patients coming with suspected foreign body in wound were followed and included in the study after the foreign body was confirmed by palpation, Radiography, Ultrasonography or exploration. Informed consent was taken on a proforma before recording the data. The fresh wounds were explored in all cases of penetrating injury where history was suggestive of retained/embedded foreign body. Digital radiographs with markers at puncture wound site and high resolution ultra-sonography was performed in cases where foreign body was not palpable. Patients presenting late for symptomatic foreign bodies in soft tissues with healed wounds were investigated by radiography and sonography for confirmation and location of the foreign bodies. The size of foreign body was measured in largest dimension with a Vernier caliper after removal. In case of non-retrieval the size was estimated from the digital X-Ray by multiplying the size of foreign body in X-Ray with magnification used for Radiography. Deeply embedded radio opaque foreign bodies were referred to orthopedic unit for removal under Image intensifier and patients were followed till discharge for completion of Proforma. All patients were asked to come for follow up at 2 weeks and 6 weeks after procedure.

Injection Lidocaine 2% with adrenaline 1:200,000 was used for local infiltration at maximum 7 mg/kg body weight. General anesthesia was given in selected cases depending on the depth, location and size of foreign body. Pre-injury Tetanus immunization status was recorded and inj tetanus toxoid and Anti tetanus immunoglobulin was given accordingly. Anti-biotic prophylaxis was given to all patients with single dose of Inj. Cephradine 25 mg/kg available in Hospital.

The proforma was filled by the attending physician and checked at discharge. The demographics like Name, age in years, gender, time of presentation, address were recorded. The time since primary insult, type of foreign body, region of body involved, whether FB was radio-opaque or radio-lucent and size of FB were also documented. The time taken in removal was recorded from skin incision to skin closure. It was noted whether foreign body was removed with or without use of image intensifier. Complications were recorded at follow up visits after 2 weeks and 6weeks of procedure. In five cases the radio lucent foreign body could not be removed in Casualty in 60 minutes so the patients were shifted to main surgical operation theater for removal of FB under General anesthesia.

The SPSS (Statistical program for Social Sciences) version 20 was used for data analysis. The results were presented as tables and graphs. For the numerical data like age, size of foreign body and time of retrieval, the mean with standard deviation were calculated. For nominal data like stratification of type of foreign body, gender and radiolucency, chi square test was used for significance. P value of <0.05 was considered as significant. Linear regression model was used to assess any association between size of foreign body and time taken in its removal.

RESULTS

From January 2010 to December 2014, 143 cases presented to A&E department of Khyber Teaching Hospital with foreign bodies in soft tissue. Only 113 cases were included in data analysis as the rest either refused or left before completion of the proforma. There were 74 (65.5 %) males and 39(34.5%) females. Male to female ratio was 1.9:1 and mean age was 26.85 ± 1.35 with a minimum of two months and maximum of 80 years while median was 24 years.

Fifty nine cases (52.2%) presented within 24 hours of injury with fresh wounds, eighteen cases (15.9%) presented within 14 days of primary insult and thirty six cases (31.9%) presented after 14 days of injury. The sewing needles and bullets were the commonest type of foreign body removed from the soft tissues. Further detail is presented in Table 1. Only sewing needles were more in female 68% as compared to all other types of foreign bodies being common in male. The extremities were mostly affected, upper limbs and lower limbs collectively contributing two thirds of all cases. The details of region of body involved are presented in ure 1.

The Digital radiographs were taken it two views for all cases except where the foreign body was easily palpable or located by Ultrasonography or when the patient needed early intervention due to associated injuries like vascular injury or profuse bleeding. The Digital X-rays were performed in 102 cases (90.3%) while

Table 1: Type of foreign body versus gender of patient

Type of Foreign Body	Male	Female	Total
Bullets/Pellets/Blast Fragments	21(18.58%)	4(3.53%)	25(22.1%)
Glass	14(12.38%)	8(7.07%)	22(19.46%)
Vegetative/Wood	6(5.30%)	4(3.53%)	10(8.84%)
Metallic (Excluding Fire Arm/BBl/Needles)	17(15.04%)	4(3.53%)	21(18.58%)
Rubber/Plastic/Fiber etc	3(2.65%)	1(0.88%)	4(3.53%)
Needles	8(7.07%)	17(15.04%)	25(22.12%)
Others	5(4.42%)	1(0.88%)	6(5.30%)
Total	74(65.48%)	39(34.51%)	113(100%)

Table 2: Type of foreign body versus removal with or without image intensifier

Type of Foreign Body	Removed without Image Intensifier & %age	Removed with Image Intensifier & %age	Could not be Removed & %age	Total with %age
Bullets/Pellets/ Fragments	23(20.35%)	2(1.76%)	0	25(22.12%)
Glass	20 (17.69%)	1(0.88%)	1(0.88%)	22(19.47%)
Vegetative/ Wood	10(8.84%)	0	0	10(8.85%)
Metallic (Non Fire Arm/BBl) (Not Needles)	19 (16.81%)	2(1.76%)	0	21(18.58%)
Rubber/Plastic/ Fiber etc	4(3.53%)	0	0	4(3.54%)
Needles	20(17.69%)	4(3.53%)	1(0.88%)	25(22.12%)
Others	6(5.30%)	0	0	6(5.31%)
Total	102	9	2	113(100%)

Table 3: Type of foreign body versus previous history of similar events

Type of Foreign Body	Previous History of Foreign Body Removal			Total
	No	Once before	More than once before	
Bullets/Pellets/Fragments	25(22.1%)	0	0	25(22.1%)
Glass	21(18.6%)	1(0.9%)	0	22(19.5%)
Vegetative/Wood	10(8.8%)	0	0	10(8.8%)
Metallic (Non Fire Arm/BBl)(Not Needles)	10(8.8%)	7(6.2%)	4(3.5%)	21(18.6%)
Rubber/Plastic/Fiber etc	4(3.5%)	0	0	4(3.5%)
Needles	25(22.1%)	0	0	25(22.1%)
Others	6(5.3%)	0	0	6(5.3%)
Total	101(89.4%)	8(7.1%)	4(3.5%)	113(100%)

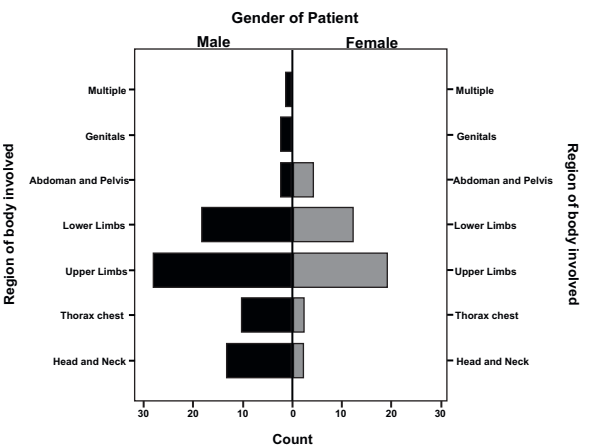

Figure 1: Region of Body involved in patients with soft tissue Foreign Bodies

11(9.7%) patients were operated without a radio graph as the foreign body was clearly visible or palpable in 9 cases (7.96%) and marked pre -operatively for removal by ultra-sonologist in two cases. In 82(72.6%) cases the foreign body was radio opaque and visible on Digital Radiography and in 20(17.7%) cases foreign body was not detected on Radiography.

Most of the foreign bodies were removed in minor Operation Theater without image intensifier and general anesthesia, nine cases (7.96%) needed image intensifier for per-operative localization and 5(4.42%) patients needed General anesthesia due to deeply embedded FBs. However in two cases the foreign body could not be removed in spite of all efforts and the procedure was abandoned to prevent further damage to soft tissues. Table 2 shows the comparison of type of foreign body and removal with or without image intensifier. The patients presenting with small metallic foreign bodies (iron spits) due to manual work with chisel and hammer reported similar events once or more than once in their past history in 12 cases (10.6%) which was significantly more than other types as shown in Table 3 (p value <0.05).

DISCUSSION

Foreign bodies embedded in wounds and soft tissues are common and usually under reported as they are presented to local clinics, emergency departments of non-teaching hospitals and sometimes in outpatient clinics[1]. We observed 113 cases in five years which was comparable to international and local reports. Salati et al reported 61 cases of FB's in hands over 6 years from Kashmir (India)[4]. From Turkey there were many articles on FB with different results. Hocaoglu et al[7] reported 86 patients with FB's in 7 years from Diyar Bakir, Ceylan MF et al[6] reported 30 cases in one year from Van and Alemdar C et al[1] reported 97 cases of FB's from Diyar Bakir. Mecott GA et al[8] from Mexico reported 14 consecutive cases in three and a half years. From Pakistan, Saaiq M published his experience in management of foreign bodies in hands twice and reported 37 cases in six years from Islamabad in his recent article published in World journal of Surgery[3,17].

The number of male patients in our study was almost twice as female patients which was in contrast to Saaiq M but conforms to contemporary reports from Other countries[3,4]. The patients presenting with foreign bodies were mostly young and the mean age was similar to other reports from Pakistan, India and Turkey[3-6].

The time of presentation since initial injury to Emergency or Outpatient Clinics is capricious in various reports in literature. Hocaoglu et al reports that two third cases attended the emergency while one-third came to outpatient clinics[7]. Salati et al reported that only 10% of his cases attended within two weeks of injury, rest of 90% came after two weeks of initial insult[4]. Our findings are comparable with Saaiq as two-third of our patients presented to Emergency department within two weeks mostly immediately after injury[3].

Needles and metallic fragments were the commonest material found as foreign body. Same is reported by Saaiq M and Alamdar et al and various other researchers[1,3]. Glass fragments reported to be the commonest FB by Hocaoglu were noted in significant number of patients but were much less than metallic fragments and needles[7]. Wood splinters and FB of vegetative nature were observed less frequently than reported by Salati et al and others[4,31]. Sewing needles were found more frequently in females probably due to their exposure to routine stitching and sewing chores at home. Bullets, pellets and fragments were also common and were documented as stray or wasted bullets of aerial firing. This aerial firing which is a way of expression of triumph in Pathan community of Pakistan especially in Khyber Pakhtunkhwa is prohibited strictly by Law enforcement agencies but still the practice prevails in remote areas this province.

Glass fragments as a foreign body were usually presented secondary to road traffic accidents and injuries due to bottles and glass ware. But now the incidence has increased due to trending of Glass furniture and use of thick glass in Aluminum Doors and Windows. This is a developing potential hazard and the injuries due to accidents with furniture glass are more extensive and devastating in terms of tissue damage.

Iron spit or fragments extruded from the chisel while hammering it were found in soft tissues of Manual labourers. Patients having this type of foreign body had same episodes in their previous history as well and some of them had been operated for such foreign bodies twice before this injury. The average size of foreign bodies removed was similar to Mecott et al from Mexico[8]. The mean time taken to remove foreign body was comparable with other studies[6,8]. We checked the correlation of size of foreign body and the time taken to remove it from the soft tissue. Though it appeared that smaller foreign bodies took more time for removal as compared to larger foreign bodies but the association was not statistically significant.

The hands and feet are the most vulnerable part for puncturing and penetrating injuries resulting in foreign bodies in wounds and soft tissue[25]. Upper limbs and lower limbs collectively contribute for four out of five cases and the same is reported in other contemporary articles. The Buttock area is bulky and challenging for removal of foreign bodies. It is difficult to localize a small foreign body in gluteal muscles and fats even with the aid of image intensifier.

The Ultrasonography was advised in all cases where FB was not visible in X-rays but was performed with intricacy due to lack of special probes for soft tissues and lack of expertise in this type of Ultrasonography. Though glass is reported to be radio-opaque in various studies but in four cases the glass was not picked up by the digital X-ray in our study probably due to small fragment size[3,10]. In metallic foreign bodies the role of radiography is still imperative. The "stereotaxis" techniques of marking distance of radio opaque foreign body from the surface of skin by using markers in two planes is helpful in localization and removal of foreign body preoperatively[6,26]. The role of Ultrasonography is becoming more evident in all fields of medicine and it is claimed to be superior or at least equivalent to conventional/digital radiography in localization of foreign bodies in soft tissue[11-12]. The real advantage is in radio lucent foreign bodies where X-ray is of no use[13-14]. The ultrasonographer not only detects but also aids in removal of foreign bodies and can suggest presence of pus or hematoma as well[15-16]. But unfortunately most of our ultrasonographers are not properly skilled in these types of procedures. Computed Tomography and Magnetic Resonance Imaging are more informative and precise but are too expensive and were not performed routinely although the facility was available at our hospital.

Most of the patients did not come for check up after procedures so the follow up was poor, which is a common happening as reported in other studies from

hospitals in Peshawar[27-29]. The wound sepsis after removal of foreign body in our study was within acceptable limits. There were cases where small fragments were missed and were not symptomatic.

There were some interesting cases that need mention. One goldsmith was very keen to get back the foreign body removed from the thenar muscles of his left hand because it was a half centimeter thin piece of Gold. Another person had a non healing sinus at his sole with a slight bulge. On exploration a 2X3 cm piece of rubber lying deep to planter fascia was removed. He recalled that he had an injury to his sole when he fell from a ladder about two and a half years ago. A female 48 years of age presented with a ganglion or bursa like swelling on dorsum of right foot with acute inflammatory changes. On incision drainage a piece of wood about three centimeters was removed from that swelling with sero-sanguinous fluid[30]. In one case the needle was removed about 45 cm away from the site of entry. The patients with needles embedded in soft tissue were much concerned because there is a strong belief in general public that "the needle moves away from its site of entry or it travels towards the heart".

A piece of drip set was removed from the scrotum of a young patient who was operated for right sided hydrocele ten months back. He was not aware of any drain left in his wound at that time. A skin staple was removed from subcutaneous tissue of post appendectomy scar. It was strange that skin staples were not used for skin closure in that patient during appendectomy. Such incidences are also reported earlier in literature[31].

The exploration of foreign body in Accident and Emergency department is unpredictable. Mostly it is uneventful but at times it is so difficult to remove a foreign body which is otherwise clearly visible in X-ray. In a 50 years old female who accidentally stepped upon a pair of scissors, three cm long piece of Scissors blade visible on Foot X-rays was not found initially but later retrieved deep from the Calcaneum bone after bone nibbling. One young male labourer presented with severe pain and hematuria of abrupt onset while working with hammer and chisel. On examination there was a small puncture wound with profuse bleed at Glans. X-ray confirmed a metal fragment/iron spit 2 mm in size which was removed in A&E department and wound closed primarily for hemostasis.

We did not record the profession or occupation of the patients which is a major limitation of our study as we are unable to relate type of injuries with occupation. Saaiq M reported that needle injuries were common in tailors but we observed that needle injuries were more common in female mostly house wives but we cannot comment as we did not record their occupation[3].

CONCLUSION

Foreign bodies in soft tissue may present with variety of symptoms, are difficult to diagnose and even more difficult to manage. There is space for further research and development of standard protocols and guidelines for management of foreign bodies embedded in soft tissues.

REFERENCES

1- Alemdar C, Demirtaş A, Gem M, Özkul E, Azboy I, Bulut M. et al. Orthopedic approach to foreign body stings. Journal of Clinical and Experimental Investigations 2013; 4 (4): 443-48. (This article is available from: http://www.jceionline.org /10.5799/ ahinjs. 01.2013 .04.0321)

2- Ozsarac M, Demircan A, Sener S. Glass foreign body in soft tissue: possibility of high morbidity due to delayed migration. J Emergency Med 2011; 41(6): 125-28.

3- Saaiq M. Epidemiology and Management of Foreign Bodies in the Hand: Pakistani Perspective. World J Plast Surg 2014; 3(1): 13-17.

4- Salati SA and Rather A. Missed foreign bodies in hand: an experience from a center in Kashmir. Libyan J Med 2010; 5: 5083-88.

5- Han KJ, Lee YS and Kim JH. Progressive median neuropathy caused by the proximal migration of a retained foreign body (glass splinter). Journal of hand surgery, European 2011; 36(7): 608-9.

6- Ceylon MF, Guner S, Ediz L, Unsal SS, Isik D. Removal of foreign bodies embedded in soft tissues by stereotaxic approach. African health sciences 2014; 14(1): 64-71.

7- Hocaoglu E, Kuvat SV, Ozalp B, Akhmedov A, Dogan Y, Kozanoglu E et al. Foreign body penetration of hand and wrist: a retrospective study. Turkish J Trauma and Emergency Surgery 2013; 19(1): 58-64.

8- Mecott GA, Moreno HC, Govea YC, Porras MG, Martinez HC. Successful extraction of radiopaque foreign bodies based on conventional radiography. Medicina universitaria 2011; 13(51): 304-11.

9- Steele MT, Tran LV, Watson WA, Muelleman RL. Retained glass foreign bodies in wounds: Predictive value of wound characteristics, patient perception and wound exploration. Am J Emergency Med 1998; 16(7): 627-30.

10- Levine MR, Gorman SM, Young CF, Courtney DM. Clinical characteristics and management of wound foreign bodies in the Emergency Department. Am J Emergency Med 2008; 26(8): 918-22.

11- Panigrahi R, Dash SK, Palo N, Priyadarshi A, Sahu SK, Biswal MR. Foreign body detection in musculoskeletal Injuries: an in vitro blinded study comparing sensitivity among digital radiography, ultrasonography, CT and magnetic resonance imaging. Musculoskelet Regen 2015; 2: 649.

12- Horton LK, Jacobson JA, Powell A, Fessel DP, Heyes CW. Sonography and Radiography for soft tissue foreign bodies . Am J Roent 2001; 176: 1155-59.

13- Blankenship RB, Baker T. Imaging modalities in wounds and superficial skin infections. Emerg Med Clin North Am 2007; 25(1): 223-34.

14- Chan VWT, Wong WK, Kwok SKY, Tang KW. Liver Abscess Caused by a Foreign Body: Management

by Minimally Invasive Ultrasound-guided Drainage. Hong Kong J Radiol 2014; 17: 267-70.

15- Acar MA, Kerimoğlu U, Karalezli N and Güleç A. Ultrasound for the Detection of Retained Plastic and Undetected Metallic Foreign Bodies in the Foot. Eur J Gen Med 2012; 9(4): 270-73.

16- Aras MH, Miloglu O, Barutcugil C, Kantarci M, Ozcan E, Harorli A. Comparison of the sensitivity for detecting foreign bodies among conventional plain radiography, computed tomography and Ultrasonography. Dento-maxillo-facial Radiology 2010; 39: 72-78. (This article is available from: http://dmfr.birjournals.org/doi: 10.1259/dmfr/68589458)

17- Saaiq M, Din HU, Khan MI, Chaudhery SM. Prentation and outcome of hand trauma in a plastic surgical unit. Ann Pak Inst Med Sci 2009; 5: 131-35.

18- Mohammadi A, Ghasemi-Rad M, Khodabakhsh M. Non-opaque soft tissue foreign body: sonographic findings. BMC Med Imaging 2011; 11: 9.

19- Armstrong AM, Molyneux E. Glass injuries to children. Br Med J 1992; 304: 360.

20- Henshaw R, Eley R, Gorman D. Broken glass as an injury hazard in an Indigenous community. Aboriginal and Islander Health Worker Journal 2011; 35(4): 8-27.

21- Sendall MC, Laing A, Barker R. Alcohol-related violence presenting to the emergency department: Is 'glassing' the big issue? Emergency Medicine Australasia 2013; 25(6): 550-57.

22- Makary MA. Reported incidence of injuries caused by street glass among urban children in Philadelphia. Injury Prevention 1998; 4: 148-49.

23- Al-Khatib IA. Children's perception and behaviour with respect to glass littering in developing countries: A case study in Palestine's Nablus district. Waste Management 2009; 2994: 1434-37.

24- Trout AT, Towbin AJ. Seasonal foreign bodies: the danger of winter holiday ornamentation. Pediatr radiol 2014; 44: 1610-16.

25- Halaas GW. Management of foreign bodies in the skin. American Family Physician 2007; 76 (5): 683-88.

26- Ebrahimi A, Radmanesh M, Rabiei S, Kavoussi H. Surgical removal of neglected soft tissue foreign bodies by needle-guided technique. Iranian J Otorhinolaryngology 2013; 70: 29-35.

27- Maroof SA, Khan K, Khan MK, Khan MJ. Torsion of testicular appendix as a cause of acute scrotum in children: experience in surgical management at Lady Reading Hospital Peshawar. J Med Sci 2009; 17(1): 40-44.

28- Maroof SA, Khan MJ, Khan Y, Uzair M. Surgical management of omphalomesenteric duct remnants in children. J Postgrad Med Inst 2009; 23(2):179-83.

29- Khan MY, Khan MJ, Maroof SA, Uzair M, Khan MT, Khan MA, et al. Surgical management of hepatic hydatid cyst in children. J Postgrad Med Inst 2008; 22(2): 144-47.

30- Kumar K and Hegazy A. Rare presentation of a wooden foreign body in thigh. Eur J Orthop surg Traumatol 2012; 22(1): 155-59.

31- Yildrim T, Parlakgumus A, Yildrim S. Diagnosis and management of retained foreign objects. J coll physicians surg Pak 2015; 25(5): 367-71.

AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Maroof SA: Concept and design, data collection.

Rehman F: Data collection and review.

Waheed R: Literature review.

Shah A: Data collection and analysis.

Yousaf A: Manuscript writing.

Gillani M: Literature review.

Aurangzeb M: Overall supervision.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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