



Esophageal Foreign Bodies in Pediatric Age Group with Different Durations of time from Ingestion to Effective Treatment

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Abstract

A foreign body (FB) is any object in a region it is not meant to be, where it can cause harm by its mere presence if immediate medical attention is not sought. Foreign body is particularly common in the pediatric population especially below 5 years of age and in whom prevalence was reported to vary between 57% and 80%. Endoscopic interventions are indicated when the foreign objects fail to pass spontaneously. The standard methods to remove these foreign bodies include push technique and retrieval methods using various endoscopic instruments. Study of 302 patients admitted with the final diagnosis of esophageal foreign body during January 2017 – April 2018, for sex, age, diagnosis on admission, estimated duration and site of impaction, type and number of foreign body removed. During the study period, 302 patients (169 males and 133 females) of different ages, maximum in the age group of 1–5 years i.e 197 cases were admitted with the diagnosis of esophageal foreign body. 11% of patients were less than 1 year of age & 23% were more than 5 years of age at the time of admission. Most of them presented to hospital within 24 hours of ingestion of foreign body i.e 85%. In this study all the children with suspected foreign body esophagus underwent Xray and FB was found in 300/302 i.e its diagnostic accuracy (sensitivity) is 98%. Rigid esophagoscopy was done in all 302 pts with 100% diagnostic accuracy. Different types of foreign bodies ingested most common being coin i.e in 91% patients followed by FB battery in 17 patients and safety pin in 6 patients. Majority of foreign bodies were located in the cricopharynx (198) followed by upper esophagus (67) and mid-esophagus (25) and only 10 cases involved the lower esophagus and spontaneous passage was found in 2 cases. The most common foreign bodies in children are coins and toys. Sharp foreign bodies are difficult to remove but need to be removed carefully at the earliest to prevent dreaded complications like - retropharyngeal abscess and mediastinitis.

Keywords Foreign bodies · Children · Esophagus

Introduction

Ingestion of foreign bodies is a relatively common emergency encountered in the field of otorhinolaryngology. Children make up roughly 80% of patients presenting to emergency departments with an esophageal foreign body. [1] According to reilly et al. [2] children less than 4 years are more susceptible to foreign body injuries due to their

lack of molar teeth, oral exploration, and poor swallowing coordination.

This high prevalence can be attributable to the inquisitive nature of children and their tendency to explore the environment and various factors such as curiosity to explore orifices, imitation, boredom, playing, mental retardation, insanity, and attention deficit hyperactivity disorder, along with availability of the objects and absence of watchful caregivers.

Most common foreign bodies in children are coins, marbles, button batteries, safety pins and bottle tops are also reported. [3, 4]

In few cases reported foreign bodies which have gone beyond the esophagus will pass uneventfully through the intestinal tract in 70–80% cases.

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In severe cases, foreign body ingestion can be life threatening. Prompt diagnosis of foreign body ingestion and removal via esophagoscopy is crucial to prevent morbidity and mortality. The key principles for endoscopic management of esophageal foreign bodies are to protect the airway, to maintain control of the object during extraction, and to avoid causing additional damage. Endotracheal intubation is sometimes necessary, especially in younger children and those at higher risk for aspiration. The use of devices such as an esophageal overtube and a latex protector hood may facilitate safer extraction of sharp/pointed objects.

Ingested objects if untreated shams various challenges in the form of complications like development of mucosal ulceration, esophageal perforation, mediastinitis, vascular trauma, aorto-esophageal fistula, pseudoaneurysm para-esophageal abscess, tracheo-esophageal fistula, pneumothorax, pericarditis, and other conditions. [5–8].

Methods

This study included 302 cases reported to the Department of Otolaryngology, Mahatma Gandhi Memorial Medical college and hospital, Indore, during the period of January 2017 – April 2018. All patients in the age group of 0–14 years reported with history of foreign body ingestion in esophagus were included. Initially a detailed history was recorded for all the patients, the majority of the subjects reported with dysphagia, odynophagia or feeling of lump in throat. After thorough clinical ENT examination all the patients were advised for neck and chest X-ray in both antero-posterior and lateral views to confirm and know the level of foreign bodies. CT scan of neck and thorax was advised in special cases where complications were suspected.

Based on the history, clinical examination and radiological investigations patients were taken for rigid oesophagoscopy and foreign body removal. All patients underwent oesophagoscopy in the operating room under general anesthesia. Rigid oesophagoscopy of appropriate size depending upon age and sex was used. Different types of foreign body forceps like alligator forcep, grasping forceps or crocodile forceps were utilized for removal of foreign bodies. After removal, esophagoscope was reinserted and the site of foreign body impaction was reexamined for any erosion of mucosa or for a possible second foreign body. After the procedure, cases were monitored.

Table 1 Age incidence

Age	No. of patients
0–11 months	19
1–5 years	197
More than 5 years	86

Results

Over a 1 and ½ years period, 302 patients (169 males and 133 females) of different ages were admitted with the diagnosis of esophageal foreign body. 19 patients were in the age of 0–11 months at the time of admission. 65.2% were between 1 and 5 years and 28.4% were more than 5 years of age (Table 1, Fig. 1). In this case series we observed that 33.7% cases turned to hospital within 0–6 h after ingestion of FB and majority i.e. 51.9% presented between 6 and 24 h of ingestion of FB and 34 patients came after 24 h and only 9 patients came after 5 days of ingestion of FB (Table 2, Fig. 2).

Different types of foreign bodies ingested in our study as shown in Table 3, Fig. 3 most common being coins in 91% cases. Majority of foreign bodies (198/302, 65.5%) were located in the cricopharynx followed by the upper esophagus (67/302), mid esophagus (25/302) and lower esophagus (10/302), with spontaneous passage of foreign body was seen in 2 patients (Table 4, Figs. 4, 5 and 6). Patients presented with a wide variety of signs and symptoms (Table 5, Figs. 7, 8, 9 and 10) and most of them had multiple symptoms. In this study all the children with suspected FB esophagus underwent Xray, and FB was found in 300/302 i.e. its diagnostic accuracy (sensitivity) is 98%. Rigid esophagoscopy was done in all 302 pts with 100% diagnostic accuracy.

Discussion

Pediatric patient's account for approximately 75–80% of esophageal foreign bodies in many studies, with a preponderance of children aged 18 to 48 months. [9].

In the present series the maximum number i.e. 65.2% (197/302) cases belonged to the age group 1–5 years. According to Reilly et al. [2] children less than 4 years are more susceptible to FB injuries due to their lack of molar teeth, oral exploration, and poor swallowing coordination. Most of the insertion/ingestion/aspirations were seen in the age group between 1 year to 5 years owing to the development of pincer grasp, following which they develop a habit of picking up random objects and putting them in their mouth, leading to increased risk of aspiration.

Local tenderness over the cervical esophagus and persistent drooling with a strong history of foreign body ingestion gave clues to impacted foreign bodies in the esophagus. In

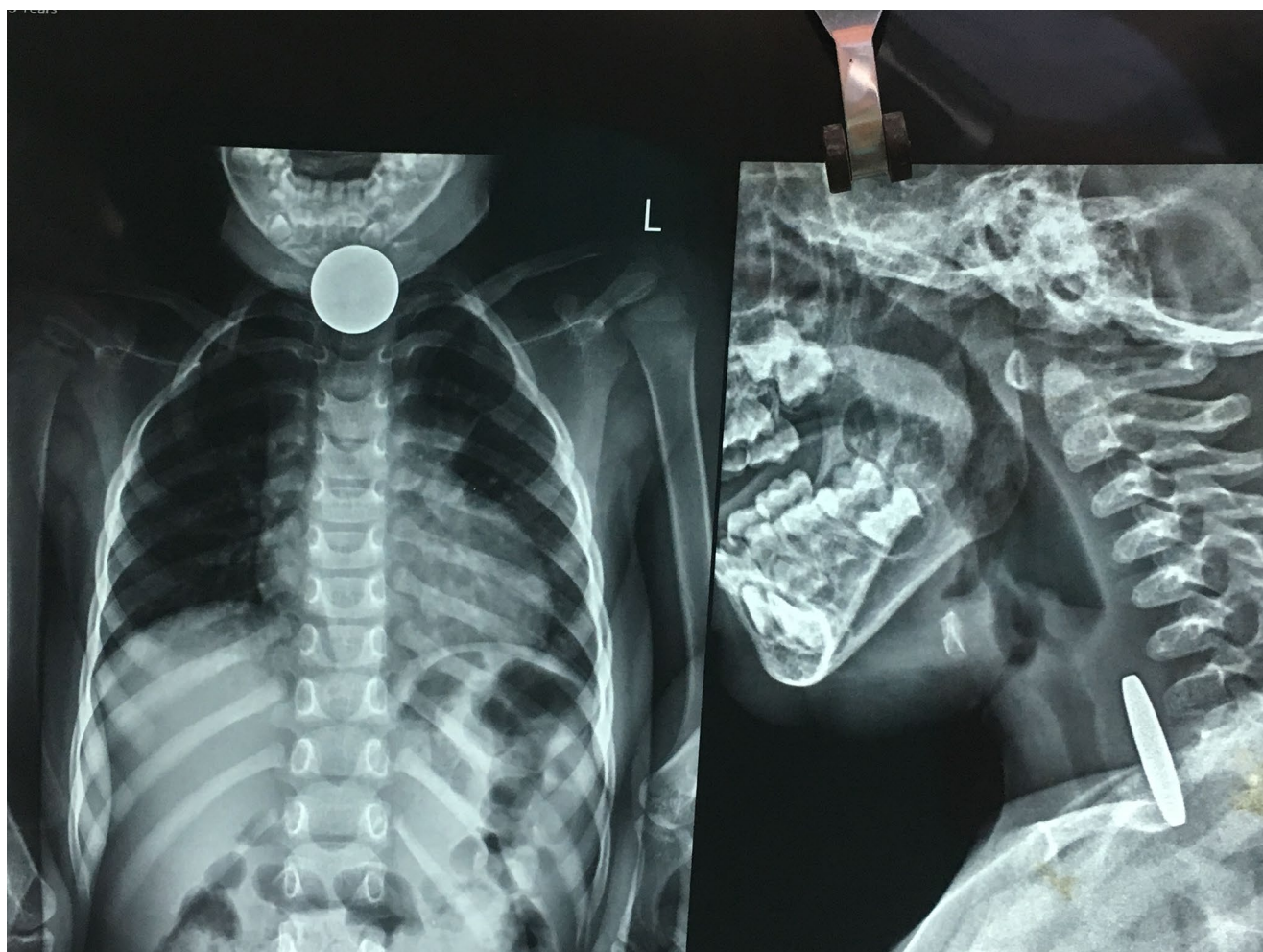


Fig. 1 - Plain X Ray chest and neck [AP and lateral view] showing radio - opaque foreign body(coin) at level of cricopharynx

Table 2 Time of presentation to hospital

Time	No. of patients
0–6 h	102
6 h – 1st day	157
1st – 4th day	34
5th day and onwards	9

our study most common presenting symptoms were dysphagia(24%), FB sensation in the throat (21%), vomiting (17%) and pain in stomach (7%). Logan Turner (1977) has mentioned that a child may have no dyspnoea or stridor and may be able to swallow fluid with a coin of 2.5 cm in diameter held just below the level of cricopharynx.

Scott Brown (1971) found that dysphagia was the commonest symptom.

N. Saki [10] et al. 2008 states that Odynophagia was the commonest symptom, followed by dysphagia. According to Gilger et al. most cases are brought to medical attention by their parents because the ingestion was witnessed or

reported to them. Many of the children are asymptomatic or have transient symptoms at the time of the ingestion.

Most of the patients are (85.7%) brought to the emergency room within 24 h hours after ingestion of the foreign body, while 2.9% came after five or more days and only 33.7% came within the first 6 h. It is dependent upon the severity of symptoms, age of patients, socio economic status, education status, awareness of family, transportation system & treating doctor.

In a study conducted by Aparna Williams et al., most of the patients presented to the hospital after 24 h of FB. The interval of time between beginning of symptoms and correct diagnosis was studied by Wiseman who, reported that 46% of children studied were diagnosed within 24 h following the onset of symptoms, 54% were diagnosed at the end of the 1 st week, 24% at the end of the 1st month, and the remaining 16% after 1 month. Various reasons for delayed diagnosis of FB in children include misleading and variable clinical history and findings, misdiagnosis by clinicians, parental delay in seeking treatment.



Fig. 2 CT scan of chest showing sharp foreign body at mid esophagus

Table 3 Types Of Foreign bodies

	Type of foreign bodies	No of cases
1	Coin	277
2	Battery	17
3	Chicken bone	1
4	Other metallic FB like safety pin	6
5	Vegetative FB i.e. tamarind seed	1

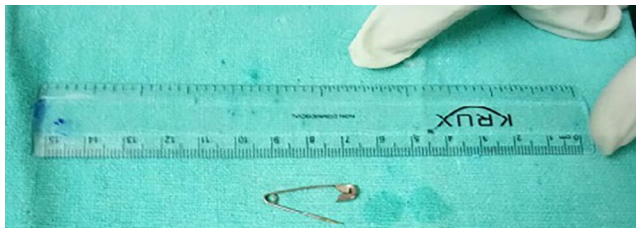


Fig. 3 Showing sharp metallic foreign body removed from mid esophagus

Table 4 Site of FB Impaction

	Site of Fb impaction	No of cases
1	Cricopharynx	198
2	Upper esophagus	67
3	Mid esophagus	25
4	Lower esophagus	10
5	Spontaneous passage	2



Fig. 4 Showing coin most common esophageal foreign body

In our study out of 302 children the most common FB was Coin i.e. in 277 pts (91%), followed by FB battery in 17 pts and 6 other metallic FB like safety pin, metallic ring etc. 1 case each of FB chicken bone and tamarind seed was reported.

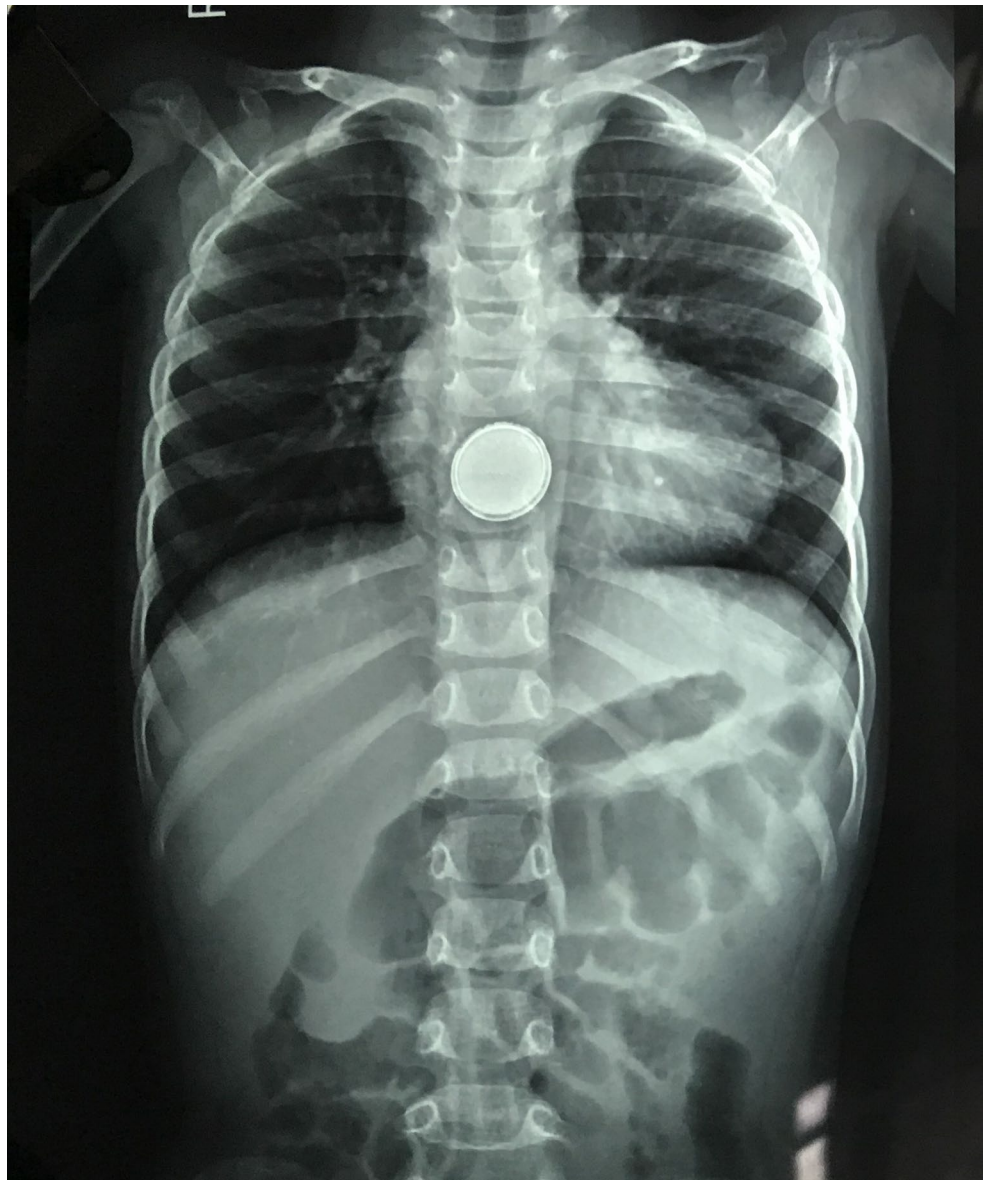
Esophageal foreign bodies can either present with incomplete or complete obstruction. In incomplete obstruction, the symptoms are milder and the patient might be able to swallow liquids. In complete obstruction, patients present with the inability to swallow liquids, excessive drooling, and possible shortness of breath. Hence, patients with complete obstruction are considered high risk for aspiration and require urgent removal [11]. The European Society of Gastrointestinal Endoscopy (ESGE) recommends that the endoscopic removal of food bolus with complete esophageal obstruction should be emergent, preferably within two hours or at least within six hours due to the high risk of aspiration [12]. Standardized endoscopic techniques including grasping forceps, polypectomy snares, Dornier-type stone retrieval baskets (Dornier MedTech, Munich, Germany), retrieval snare net, transparent cap-fitting device (used for endoscopic mucosal resection) [13], and overtube [14, 15] have been used to remove foreign bodies from the esophagus.

Blunt and flat foreign bodies do not cause any harm to the esophagus early but sharp foreign body such as bone piece and safety pin may cause retropharyngeal edema and air impaction around foreign body which in long term may develop into retropharyngeal abscess.

Battery cell impaction is very dangerous and it leads to release of alkali chemicals which causes local irritation, edema, corrosion of mucosa, and stricture formation, should be removed immediately. Rare complications of long term foreign body impaction include esophageal perforation, mediastinitis, tracheo-esophageal fistula, visceral rupture, peritonitis, and abscess formation. In our series no such complications were seen.

In recent years, children have been increasingly exposed to electronic technology containing button batteries. These may be potentially inhaled or ingested. In this study the

Fig. 5 Plain x ray chest showing button battery at lower esophagus



most common site of FB esophagus was cricopharynx i.e. 198/302 (65%) followed by upper esophagus i.e. in 67 pts (22%). In this study all the children with suspected fb esophagus underwent X Ray., and FB was found in 300/302 i.e. its diagnostic accuracy (sensitivity) is 98%.

Rigid esophagoscopy was done in all 302 pts with 100% sensitivity.

Saki N. et al. [10] reported the sensitivity and specificity of conventional radiograph in the diagnosis of an FB esophagus were 100% and 84.2%, respectively.

Study conducted by Williams et al. [16] showed the same results i.e. cricopharynx and upper esophagus.

Jackson & Jackson (1951) reported that roentgen ray is the most valuable diagnostic aid. If there is no evidence of foreign body, a diagnostic laryngoscopy, bronchoscopy or

esophagoscopy can be performed. Negative skiagram does not rule out the possibility of radiolucent FB.

Lateral soft tissue neck X-rays represent a quick, relatively low radiation dosage and low cost radiological modality and provided useful information which would have helped in the clinical management of more than half the patients with non-aspirated, upper aero-digestive tract foreign bodies, however X-rays should complement and not replace clinical history-taking and examination (Karnwal et al. 2008).

Radiographic evaluation including soft tissue lateral neck radiograph and wide chest radiograph of neck and chest suggests the level of impaction. It also gives clues regarding shape, size and nature of foreign bodies. Coins and battery cells are usually oriented coronally in the esophagus mostly at the level of cricopharynx. Radiographically, the battery

Fig. 6 Showing Metallic foreign body i.e. button battery covered with burnt mucosa



Table 5 Sign and Symptoms

	Signs and symptoms	No. of cases
1	Witnessed insertion	278
2	vomiting	54
3	FB sensation in throat	65
4	dysphagia	75
5	Stomach pain	23

cell shows a “double contour or double ring shadow” on the antero-posterior view and “shouldering” on the lateral view in neck radiograph.

Timing of endoscopy is very crucial to reduce morbidity and mortality. Disc batteries and sharp pointed objects with obstructive symptoms requires emergent endoscopic removal. Blunt foreign body like coins, food bolus not causing complete obstruction, magnets and objects 2.5 cm diameter in an asymptomatic patients can be observed for 24–48 h, but after 48 h they must be removed endoscopically irrespective of their clinical presentation.

Conclusion

Foreign bodies are a common problem in children, requiring prompt recognition and early treatment to minimize the potentially serious and sometimes fatal consequences.

Accidental insertion/ingestion of both organic and non-organic FBs continue to be a cause of childhood morbidity and mortality. Prevention is best, but early recognition remains a critical factor in the treatment of FB in children. Diagnosis depends on high level of suspicion in a child like FB insertion/ingestion witnessed by attenders. This study concludes that x-ray is a good and reliable diagnostic technique for diagnosing radio opaque foreign bodies.

Rigid endoscopies are the gold standard diagnostic and therapeutic modalities in aerodigestive foreign bodies.



Fig. 7 Xray soft tissue neck showing foreign body at level of cricopharynx i.e. chicken bone

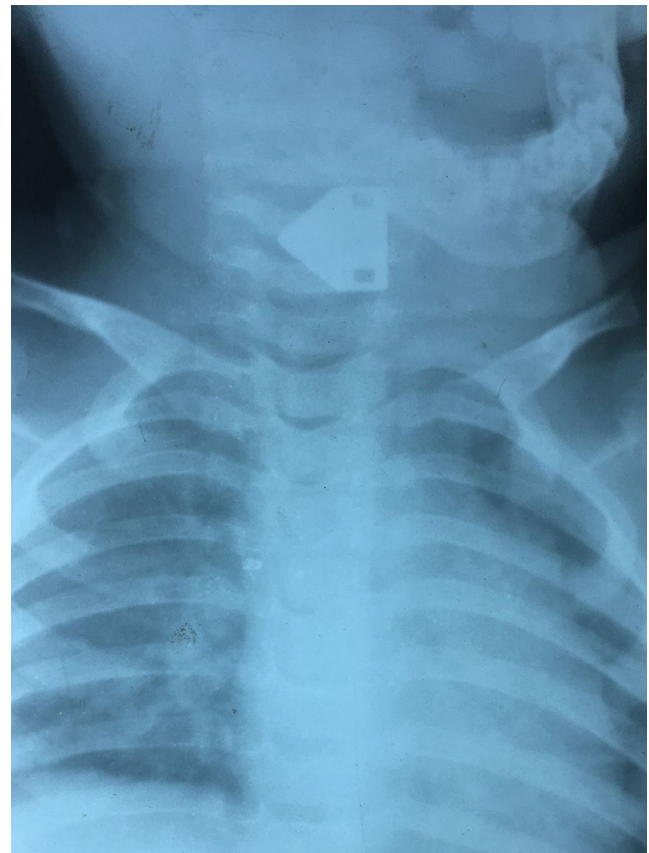


Fig. 9 Plain xray neck showing radio opaque foreign body i.e. sharp metallic button at cricopharynx level.



Fig. 8 Showing chicken bone removed from cricopharynx

Fig. 10 Showing metallic foreign body removed from cricopharynx



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Declarations

Conflict of interest The authors declare that there is no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institution.

Informed Consent Was obtained from all individual participant's attendees involved in the study.

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