Cochlear Implant Rehabilitation During Covid-19 Pandemic: A Parents' Perspective

Lokanath Sahoo

Command Hospital Pune <https://orcid.org/0000-0002-3505-6296>

Abha Kumari (✉ abhak12@gmail.com)

Command Hospital Pune <https://orcid.org/0000-0001-9589-3187>

Uma Patnaik

Command Hospital Pune

Gunjan Dwivedi

Command Hospital Pune

Research Article

Keywords: Cochlear implantation, Auditory verbal therapy, Mapping, Trouble shooting, Tele medicine, Tele audiology, Habilitation

Posted Date: September 17th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-79606/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Aim and Objectives: The current study was undertaken to assess the effect of Coronavirus disease 2019 (COVID-19) pandemic on cochlear implant rehabilitation of children with congenital non syndromic bilateral severe to profound sensorineural hearing loss (SNHL). The objectives were to find out the psychological impact of COVID-19 on parents of children with cochlear implant habilitation, to assess the performance of children with cochlear implant habilitation through tele therapy and to analyze the problems faced by the parents to obtain the professional hearing health care services for their cochlear implanted children.

Material and Methods: An online questionnaire survey was conducted amongst the parents of children who had undergone cochlear implantation (CI) consequent to congenital severe to profound SNHL. Prior to COVID-19 pandemic, these children received regular auditory verbal therapy (AVT) including visits to the Centre for audiological services (mapping and troubleshooting of the speech processor).

Results: The online questionnaire survey, undertaken by a total of fifty (50) parents was analyzed. All the parents unanimously reported that COVID-19 pandemic has adversely affected access to the professional health care services for regular mapping and troubleshooting of the speech processor and thus their children's rehabilitation. However, active involvement between the professional health care services and the parents through video consultation and tele auditory verbal therapy has definitely helped the children to a great extent.

Conclusion: The present study emphasises the great challenge posed by the COVID-19 pandemic for continued rehabilitation of CI children. To overcome this situation, an innovative digital media to address such medical issues through tele medicine, tele audiology and tele therapy is warranted.

Introduction

Cochlear implantation has been a life changing invention, restoring one of the five senses in children with congenital non syndromic bilateral severe to profound SNHL, who are not getting adequate benefit with hearing aids. The parents of children with congenital bilateral severe to profound SNHL face challenges in their day to day life[1,2]. Congenital hearing loss in children is one of the most important public health challenge[3]. Children with congenital bilateral severe to profound SNHL are conventionally managed and rehabilitated using either hearing aids (HAs) or cochlear implantations (CIs). Post deployment of HA or CI, auditory rehabilitation is one of the most important and essential aspect for the development of speech and language. The care and maintenance of HAs and speech processor along with continuous AVT are of utmost importance to help achieve the essential goals [4]. For the optimal clinical outcome, the post cochlear implant rehabilitation should be seamless and uninterrupted under the guidance of hearing health care professionals. Studies documenting development of excellent linguistic skills in children through seamless post CI rehabilitation are available in literature [5,6].

The cochlear implant rehabilitation has been affected to a greater extent consequent to coronavirus disease 2019 (COVID-19) pandemic [7]. CI helps in eliminating the psychological impact, improves the quality of life and facilitates mainstreaming of these children into the society [8]. Any interruption in post implant habilitation is likely to affect the outcomes and have psychological impact on both the children and their parents[9]. The wide spread nature of the COVID-19 has necessitated extra care and alteration in all post implant management [10]. The parents of children with congenital severe to profound SNHL have significant psychological impact especially when the hearing health care services gets interrupted [11].

The psychological impact of this COVID-19 pandemic is observed all across the globe. The pandemic has a profound effect on the cochlear implant recipients, who were undergoing AVT after the switch on of their speech processor [12]. To contain the spread of COVID-19, the government authorities-imposed shutdown, lockdown, restriction on movement of public transport and also set necessary social distancing norms. However, inadequate access to the trained health care facilities during this period has resulted in provision of suboptimal care to the CI recipients. Although the mandatory use of face mask is warranted amid this pandemic, its use has further hindered the communication among post CI children. Considering these factors, our cochlear implant team decided to opt for the tele medicine, tele audiology and tele AVT provision to these children.

In view of the above, this study was designed to assess the impact of COVID-19 on cochlear implant habilitation process for cochlear implanted children from their parents' perspective.

Materials And Methods

The study was undertaken from Jun 2020 to Aug 2020, at the audiology unit of otolaryngology department of our tertiary care hospital. The institutional ethical clearance was obtained prior to the study. Considering the social distancing norms, imposed restrictions on movement and contemplating the safety of the participants, verbal consent was obtained telephonically from all the participants for inclusion into the study. The consent script was thoroughly explained to all the participants, as well as consent obtained for publication of this data.

Procedure

This study was designed for the parents of cochlear implanted children undergoing AVT prior to the COVID-19 pandemic. This study involved the parents of CI children residing in the southern region of India and implanted at our tertiary care hospital. The cochlear implant team (cochlear implant surgeon, audiologist, speech pathologist and auditory verbal therapists) were actively involved in contacting the participants and documenting the responses.

Preparation of Questionnaire

A questionnaire(*table-1*) was prepared by the CI team after thorough discussion with all the authors and reviewed by all the team members (Audiologist, Cochlear Implant surgeon, speech pathologist and AVT)

usually involved in the assessment and management of children with congenital non syndromic bilateral severe to profound SNHL. There are total fourteen (14) questions covering all the aspects focusing on the challenges faced by the parents during cochlear implant rehabilitation of their children including equipment related challenges. The questions are presented in a scattered manner in the questionnaire. The questionnaire was prepared in English then translated to Hindi by a five-member team of Hindi speaking experienced and renowned speech language pathologist for the ease of understanding of the participants.

Administration of Questionnaire

The participants were chosen randomly from the departmental data base and the questionnaire sent to them through their email in the form of an editable word file where they can fill their answers within that file. The responses were analysed by the team (Authors). The language used in the questionnaire was simple and self-explanatory in nature with completion time line of fourteen (14) minutes. The questionnaire focussed entirely on the experience of parents during COVID-19 pandemic. The respondents were instructed to choose one of the three response options (Yes, No and Up to some extent). The participants were well informed about the option of withdrawing from the study, any time during the data collection and analysis stage of the study.

Data Analysis

The responses obtained were analysed categorically by the team of experts (authors) and represented in percentages.

Results

The data pertaining to CI recipients who had completed one year of personalised auditory rehabilitation prior to commencement of the pandemic was retrieved. Of the 55 parents who were presented the questionnaire survey, all but five responded within the stipulated time frame. Finally, 50 patients were included in the study and data analysed. The parents' responses are illustrated in *Table 2*.

All (100%) parents adumbrated that due to COVID-19 pandemic, they have faced significant difficulties in assessing the hearing health care facilities. The parents also reported that they were not able to reach the rehabilitation centre for mapping and trouble shooting. 94% parents observed marked behavioural changes among their children during this pandemic. 98% parents experienced psychological impact (in terms of rehabilitation of their children) amid this pandemic. However, 4% and 2% of the parents reported nil and mild behavioural changes respectively among their children. With respect to tele therapy, 96% of the parents documented that this new method has helped their children but also conceded that they faced challenges during the online sessions. The answers of the questions pertaining to challenges faced from parents' perspective are represented in *Figure 1*.

The mental state of parents was also affected due to the challenges faced by the CI user during this pandemic. Because of the face mask, 88% of parents reported that their children faced difficulties to use the speech processor. Interestingly on the other hand, during this lockdown, 96% of parents agreed that their children were adequately using the speech processor. However, 100% parents reported that the access to AVT sessions got affected during this pandemic. 90% of parents agreed that their children faced challenges during online school classes. However, during this pandemic a significant number of parents (96%) noticed behavioural changes among their children. The answers pertaining to challenges faced by parents from user perspective are represented in *Figure-2*.

Discussion

The aim of this study is to understand the effect of COVID-19 pandemic on parents of children with CI. The results of this study revealed that the current pandemic had a significant effect on both, the parents and CI recipient children. It is an undebatable topic that the access to the complex hearing health care services has become a challenging factor from the parent's perspective [3,11]. Even during normal circumstances, it has already been proven that the hearing loss in children is a challenge for their parents. The post CI rehabilitation such as AVT, regular mapping and troubleshooting are very crucial following the "switch-on" of the speech processor for a better outcome and mainstreaming of affected children to the society [1,13,14]. Through regular mapping, the audiologist used to provide optimal current level which helps in development of auditory sensation [15,16]. The current study has demonstrated the psychological impact (both to the CI recipients and parents) consequent to COVID-19 pandemic.

Most of the parents emphasised the challenges they faced with the home training methods, suggested by the clinician or therapist. This may be due to the effect of boredom resulting from unaccustomed confinement in home for longer periods. In such conditions, the children might also become less cooperative and hence face difficulties in getting accustomed to the remote training methods.

The parents were also burdened with the issues related to the CI user. During this pandemic 96% parents reported the breakdown of cochlear implant accessories and speech processor, which affected the auditory as well as verbal mode of communication. The imposed travel regulations amid COVID-19 pandemic hindered obtaining optimal access to the hearing health care facilities, much needed for trouble shooting and replacement of faulty speech processor. Available data has documented adverse clinical outcomes, following interruption in auditory stimulation of CI children [11]. The results of our current study also suggest that during this pandemic 94% of parents noticed remarkable behavioural changes in their children. Such behavioural and psychological changes observed in both the children as well as parents will have impact on home-based therapy planned by the hearing health care professionals.

In our study we also focused on solutions or alternative options to tackle this situation by incorporating innovative methods to access the hearing health care services. In our centre we have started the tele audiology services [17,18] through which hearing health care professionals can provide remote mapping

and required trouble shooting. We have also started the tele-therapy or tele-AVT programme for our CI recipients, where the parents can engage their children with the therapist through the interfaces like mobile or computer. In this study 96% parents reported that tele therapy or tele audiology has helped their children.

Conclusion

This study emphasizes the impediment faced by the parents in handling their children's hearing need during this pandemic. Through this study, it's clear and evident that the COVID-19 pandemic has posed a great challenge both for CI children and their parents. They faced difficulties in accessing the hearing health care services and facilities of auditory rehabilitation or AVT. In this study, it is also observed that the digital devices and technology utilizing tele medicine, tele audiology and teletherapy platforms would play a major role in providing methodological delivery of cochlear implant rehabilitation. Though nothing can substitute the personalized "in-person" auditory rehabilitation process, but we must take initiatives to develop facilities to cartel such challenges in coming future by exploring new dimensions in the form of websites, apps, methods for unprecedented delivery of the services.

Declarations

Funding: None

Conflict of Interest: The authors declare that they have no conflict of interests.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Consent: Consent was obtained from all individual participants included in the study.

References

1. Sahoo L, Sahoo KS, Nayak NK, Behera A. Outcomes of Hearing Aid and Cochlear Implantation in Case of Congenital Non-Syndromic Bilateral Severe to Profound Sensorineural Hearing Loss: An Observational Study. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2020 Jul 16:1-7.
2. Harrison LJ, McLeod S. Risk and protective factors associated with speech and language impairment in a nationally representative sample of 4-to 5-year-old children. *Journal of Speech, Language, and Hearing Research*. 2010.
3. Bush ML, Kaufman MR, McNulty BN. Disparities in Access to Pediatric Hearing Healthcare. *Current opinion in otolaryngology & head and neck surgery*. 2017 Oct;25(5):359.
4. Shivaprakash S, Castro NO. Performance of Hearing-Impaired Children with Hearing Aid and Cochlear Implant in Auditory Verbal Therapy. *Scholarly Journal of Otolaryngology*. 2019 Jun

13;2(3):10-32474.

5. Geers AE, Nicholas JG, Sedey AL. Language skills of children with early cochlear implantation. *Ear and hearing*. 2003 Feb 1;24(1):46S-58S.
6. Connor CM, Craig HK, Raudenbush SW, Heavner K, Zwolan TA. The age at which young deaf children receive cochlear implants and their vocabulary and speech-production growth: is there an added value for early implantation?. *Ear and hearing*. 2006 Dec 1;27(6):628-44..
7. Ludvigsson JF. Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults. *Acta Paediatrica*. 2020 Jun;109(6):1088-95.
8. Brüggemann P, Szczepek AJ, Klee K, Gräbel S, Mazurek B, Olze H. In patients undergoing cochlear implantation, psychological burden affects tinnitus and the overall outcome of auditory rehabilitation. *Frontiers in human neuroscience*. 2017 May 5;11:226.
9. Ornell F, Schuch JB, Sordi AO, Kessler FH. "Pandemic fear" and COVID-19: mental health burden and strategies. *Brazilian Journal of Psychiatry*. 2020 Jun;42(3):232-5.
10. Dham R, Arumugam SV, Dharmarajan S, Mathews S, Paramasivan VK, Kameswaran M. Interrupted cochlear implant habilitation due to COVID-19 pandemic-ways and means to overcome this. *International Journal of Pediatric Otorhinolaryngology*. 2020 Aug 25..
11. Geers AE. Factors affecting the development of speech, language, and literacy in children with early cochlear implantation. *Language, Speech, and Hearing Services in Schools*. 2002.
12. Ayas M, Al Amadi AM, Khaled D, Alwaa AM. Impact of COVID-19 on the access to hearing health care services for children with cochlear implants: a survey of parents. *F1000Research*. 2020;9.
13. Schafer EC, Thibodeau LM. Speech recognition in noise in children with cochlear implants while listening in bilateral, bimodal, and FM-system arrangements. *American Journal of Audiology*. 2006..
14. Teagle HF, Park LR, Brown KD, Zdanski C, Pillsbury HC. Pediatric cochlear implantation: A quarter century in review. *Cochlear implants international*. 2019 Nov 2;20(6):288-98.
15. Gagnon EB, Eskridge H, Brown KD. Pediatric cochlear implant wear time and early language development. *Cochlear Implants International*. 2020 Mar 3;21(2):92-7.
16. Liu S, Wang F, Chen P, Zuo N, Wu C, Ma J, Huang J, Wang C. Assessment of outcomes of hearing and speech rehabilitation in children with cochlear implantation. *Journal of Otology*. 2019 Jun 1;14(2):57-62.
17. Swanepoel DW, Hall III JW. A systematic review of telehealth applications in audiology. *Telemedicine and e-Health*. 2010 Mar 1;16(2):181-200.
18. Buckman M, Fitzharris K. Teleaudiology and Cochlear Implant Appointments. *The Hearing Journal*. 2020 May 1;73(5):30-1.

Tables

Table-1 Questionnaire administered to evaluate the impact of COVID-19 on the parents of Cochlear implanted children

S.N.	Questions	Responses		
		A	B	C
1	Did your child use his/her speech processor during the lockdown at home?			
2	Do you think your child face difficulties to use speech processor with mask?			
3	Do you think your child face difficulties to attend the online sessions with mask?			
4	Has COVID-19 pandemic impacted the access to hearing health care services for your child			
5	Do you feel access to auditory verbal therapy was affected due to COVID-19 pandemic?			
6	Did you face difficulties or challenges in visiting to the hospital for scheduled appointment for post cochlear implant habilitation/ trouble shooting/ mapping			
7	Do you face challenges in attending tele therapy session?			
8	Did you face breakdown of cochlear implant part/ accessory during this COVID 19 pandemic and did it affect the auditory communication of your child			
9	Has Tele speech therapy/ video consultation helped your child			
10	Home training methods as told by therapists was challenging			
11	Was it possible to give home training as directed by clinician?			
12	Is your child taking online school classes, if yes did he face challenge in taking online school classes?			

13	Did you notice any behavioural change in your child during lockdown?
14	COVID-19 has affected you psychologically in terms of rehabilitation of your child / or do you feel COVID-19 is distressing for parents

(S.N.: Serial Number, COVID-19: Coronavirus Disease 2019, A- Yes, B-No, C-Up to some extend)

Table-2 Responses of the parents of Cochlear Implanted Children

Questions	Yes (%)	No (%)	Up to some extend (%)	Total (%)
Q1	96	0	4	100
Q2	88	8	4	100
Q3	80	16	4	100
Q4	88	0	12	100
Q5	100	0	0	100
Q6	100	0	0	0
Q7	96	2	2	100
Q8	60	24	16	100
Q9	96	0	4	100
Q10	94	2	4	100
Q11	34	44	22	100
Q12	90	2	8	100
Q13	94	4	2	100
Q14	98	0	2	100

(Q- question, %-percentage)

Figures

Figure 1

Challenges faced from parents' perspective

Figure 2

Challenges faced from user perspective