

## **Representation, Projection and Cochlear Implant: a single case study**

MENTO CARMELA<sup>1</sup>, GALLETTI FRANCESCO<sup>2</sup>, GALLETTI BRUNO<sup>2</sup>, LONGO PATRIZIA<sup>2</sup>, BITTO EMANUELA<sup>3</sup>, RIZZO AMELIA<sup>3</sup>, SETTINERI SALVATORE<sup>3</sup>

<sup>1</sup> Department of Neuroscience, University of Messina, Italy

<sup>2</sup> Department of Otorhinolaryngology, University of Messina, Italy

<sup>3</sup> Department of Human and Social Sciences, University of Messina, Italy

Email Corresponding author: [amrizzo@unime.it](mailto:amrizzo@unime.it)

**Abstract:** From the psychological point of view hearing is an essential sensory modality for the human species, because it contributes to the formation of the first relational connections and emotions. It is important to make a diagnosis early to intervene and limit negative effects. Deafness is a particular phenomenon (onset, types), in this paper we undertake a thorough descriptive analysis on all aspects of deafness, in particular the use of a prosthetic device known as cochlear implant. We have deepened personality variables in a single case with the use of Rorschach Test and Draw-a-

person-Test. We aimed to study, with the clinical interpretation of instruments, which personality variables could be involved in hearing loss condition and Cochlear Implant (CI). This observational study highlights the psychological dynamics that should be taken into account by operators team, in order to improve the quality of life of these patients and increase their long-term therapeutic outcome.

**Keywords:** Cochlear implant, Projective technique.

## **Introduction**

Deafness is a condition of decrease or loss of hearing (Maragna, 2000). There are different types, for example a sensorineural form. In this case, the lesion is in the inner ear/cochlea or in the acoustic nerve. Deafness can be of many forms: (1) *prenatal*, if it occurs before birth due to hereditary origin, toxic or viral causes; (2) *perinatal*, if it occurs at birth, usually for asphyxia or jaundice; (3) *postnatal*, this form may occur in the first few months of life as a result of meningitis; (4) *over the years*, to head trauma, poisoning, viral forms, etc. The post-verbal deaf retains virtually unchanged language skills, but in the case in which no action is taken, verbal communication is compressed and there are important implications for the psycho-social sphere (Maragna, 2000; De Filippis, 2002). According to Pizzo & Garotta's studies (2002), the consequences of organic changes as a result of deprivation sound levels have an impact on intelligence, attention, memory, and even on character and relationships. The cochlear implant (CI) represents the elective treatment method for profound deafness and specifically for cases who don't have positive results from classic hearing aids (Gantz *et al.*, 1993). The C. I. is practiced in many specialized centers and also at the "Auricular Peloritano Group" of Messina. It consists of a device that introduces the electrodes inside the damaged cochlea and restores the range of sounds artificially, allowing the passage of the external input and its elaboration processes to the auditory nerve. Bionic ear converts sound information into electrical signals, stimulate the auditory nerve and reached cortical areas. There is an important difference between the CI and the traditional hearing aid, in fact, it amplifies the sound signals that stimulate undamaged nerve cells in the inner ear, so a profoundly deaf doesn't draw benefits. The CI is able to transform acoustic information into

electrical signals even for a totally destroyed Organ of Corti, stimulating the auditory nerve and enabling sounds perception (Ahmad *et al.*, 2012). Changing lifestyle, progressively adapting to the CI, dealing with the novelty and integrating in the social and familiar environment, are crucial aspects in the evolution of the implanted person and we must, therefore, take into account the possible changes in personality, communication and social skills (Clymer, 1995). The psychological assessment should be an integral part for the analysis of the patient candidate to CI. This assessment includes: (a) A *personality assessment*, to make assumptions on the motivations and collaborative attitudes, paying particular attention to signs of discomfort, rejection, opposition (Sebastiani & Mastronino, 1996). It is also important to assess the degree of consistency between what the subject says and what his family reports. (b) *subsequent evaluation*, using standardized instruments, following the ascertained audiological suitability of the patient to the prosthesis. A further step will be the deepening of *neuropsychological functioning* (IQ, visual-motor skills, memory), personality characteristics, social competence, socio-cultural and linguistic-communicative level (Fagan *et al.*, 2007). According to this premises, we aimed to verify the relationships between deafness and personality, using the Rorschach projective technique and the Draw-a-person test.

## **METHODS**

### ***Instruments***

Representation's study was made with the use of Rorschach projective technique, analyzed according to the directions of the Italian school (Passi Tognazzo, 1994), and the Draw-a-person-Test by Machover.

Projective techniques are based on the psychological mechanism of projection, that is the attribution of the inner world's emotions to the outside world. Thanks to massive use of the mechanisms of projection, the person can express his feelings and give shapes and meaning to what he sees, leading to access his most remote and unconscious feelings, fears and desires (Settineri & Mento, 2011).

The qualitative analysis took advantage of the interpretation according to the Jungian symbolism.

### ***Rorschach test***

The Rorschach technique (Rorschach, 1942) is a psychological test, consisting of ten inkblot tables, that explores the subjective organization of the content and form of the ambiguous stimuli presented. Responses are recorded, analyzed and interpreted to examine personality characteristics and emotional functioning. Each Rorschach's table has a main theme, with an important interpretative value supported by the psychoanalytic theory.

The first card initiates the test, marked out of the contact with the examiner and new situations. It offers the opportunity to evaluate the adaptability of the subject. The second card, is in color, especially the red refers to the aggressive drives or its suppression. The third card is easy to interpret and it elicits a popular response, that can be considered the image of identification and self-representation. The fourth card, for its dark appearance may generate anxiety, it is connected with the father's image. A discomfort in this case may express anxiety or guilt from the superego. The fifth card is the table of reality. The possible absence of the popular response has a negative value. The sixth card is the table of sexuality because suggests sexual interpretations (top / male sexuality, bottom / female sexuality). The seventh table is the main maternal image, the great central depression can evoke the uterus. The eighth card, is the first multi-colored, these stimuli are linked to the affective sphere and images regarding identity. The ninth card, is the most difficult to interpret because it has a vague form. It can be considered another maternal theme. The tenth card represents the family, it differs from previous polychrome cards because of its dispersivity and variety of shapes and colors, which could be experienced by the subject as fragmentation / spaltung. In the *Inquiry Phase* the examiner clarifies the factors that led each answer, in order to correctly code responses into five categories: (1) *Location*: the section or area of the inkblot being used, with four possible symbols ranging from the whole inkblot to an unusual detail; (2) *Determinants*: the features, style, characteristics, or aspect of the inkblot that the examinee responded to (form, movement, color, shading); (3) *Contents*: the name or class of object(s) used in the response, from whole human to x-ray.; (4) *Popular Responses*: the coding goal is to determine whether the examinee's response is the conventional or unconventional given response for each card; (5) *Special Scores*: the presence of an unusual characteristic(s) in the response, from deviant verbalizations to color projection.

Coding Rorschach responses requires taking all of the text transcribed during the test administration (qualitative material) and turning it into numeric scores (quantitative information) that will later be used in the structural summary, and ultimately, for interpretation (Rose *et al.*, 2001).

### ***Machover Draw a person test***

By people Drawings we can get a lot of information on affectivity. In the drawing of the human figure we can observe personality projection (Machover, 1949). During the test administration the patient is offered a piece of paper, a pencil and a medium-hard rubber and is said "Please draw a person" or "draw a human figure". The drawing is a self-projection and self-representation, since there is a relationship, both static and dynamic, between the self-image and the Draw-a- Person Test (Ludwig, 1969). During the interpretation of the drawing several data must be taken into account: formal (size, position, attitude), graphology (stretch and pressure on the sheet) and content (body parts and any details).

## **CASE REPORT**

### ***Biography***

The patient reports a typical development of speech, hearing and social relations up to the pre-school age. She pinpoints the beginning of the hearing problems at the age of 7, during the second year of elementary school. At that evolutionary moment, have become more obvious the difficulties to correctly distinguish the sounds punctuated by the teacher during class dictations. Because of the shame felt, the patient began to hide her difficulties with avoidant behaviors and a progressive relational closure, which became evident for the educators, especially for the sudden decline in academic performance. The feelings of shame and withdrawal lasted throughout adolescence, a delicate phase in which she used a hearing aid in exclusively on the right ear. At the age of 30, following a worsening of hearing, it was necessary the Cochlear Implant on the left ear. Presently, the patient is 34 years old, she works as a teacher. During the test, show an oriented, cooperative and euthymic behaviour, she also shows high satisfaction with the quality of life she has after the Cochlear Implantation, although sometimes, in the moments when she feels over-stimulated, she switch off the prosthesis, in order to isolate herself from the outside world.

### ***Clinical Observation***

In the outpatient setting, and during the mapping step, the patient appears calm and cooperative towards the speech therapist. She is pleased to have been chosen to undergo surgery CI The patient reported that she had greatly improved her quality of life compared to traditional hearing aid, of which she still benefits from.

## **RESULTS**

### ***Quantitative analysis***

The Rorschach protocol (Table 1) presents a responses production within normal limits (14 R), in a total time of 16 minutes.

**Table 1** – Case (Female, 36; kindergarten teacher) Rorschach responses.

Table	Response	Inquiry	Coding Categories
I	Carnival mask, I don't like the colour.	"I work as a preschool teacher, children have fun with the Batman masks or Halloween, but I like the funny clown type." For the shape.	G F- mask Color shock
II	Suddenly looks like a sad person for the eyes.	"The red ones are sad eyes down; blood in the red at the bottom the nose. It seemed to me sadness." For the color.	G CF U Red shock
III	Two people talking and discussing, they seem to be seated.	"Little bow, fountain too, a meeting point between them (appetizer). They seem seated; for the breast could be two women, also for the shoes." For the color and the shape.	G M U Popular; Passive movement
IV	Shoes in the bottom; boots; I don't like dark colors.	"There is a heel and as they rise there are bon bon". For the shape.	D F- obj; D F- obj; Dark shock
V	Bat.	For dark color and shape.	G F+ A Popular
VI	It seems a fish.	"The whole figure, those of the seabed". For the shape.	G FCho A
VII	Two bunnies.	"For their long ears" For the shape.	DdD F+ A
VIII	I like most these colorful; two animals who want to climb a mountain.	For the paws. They want to climb, the mountain rises higher. For the shape.	D FM A Popular Color shock
IX	The color I prefer! Three ice cream flavors: strawberry, mint.	For the color.	G CF icecream orig - Color shock
X	It seems in the middle of the sea; crabs; jellyfishes; plankton.	"Seahorses in pink, marine snails." Especially for the shape, but also for colors.	G CF A; D F+ A Popular; D F- A orig - D F- A

From a quantitative view, as can be seen in table 2, most of Rorschach indices are similar to normative values obtained in the Italian sample (Passi Tognazzo, p.149).

**Table 2** – Single case Rorschach indices compared to the normative Italian sample.

Rorschach indices	Single case	Normative Italian values	Rorschach indices	Single case	Normative Italian values
R	14	14 – 23	F (C)	0	0
G	7	7 – 11	F Cho	1	0 – 2
G %	50	37 – 61	Cho F	0	0 – 1
G + %	57	78 – 100	Cho	0	0
D %	42	33 – 56	A %	57	35 – 55
Dd %	0	0 – 5	U %	14	9 – 21
Do	0	0	Anat %	0	0 – 8
Dbi	0	0 – 1	Sex	0	0
F %	57	56 – 76	Pt	0	0 – 2
F + %	37	74 – 92	Nat	0	0 – 2
M	1	0 – 2	Geo	0	0
FM	1	0 – 1	Ogg	2	0 – 4
m	0	0	Arch	0	0
FC	0	0 – 2	Ban	4	4 – 7
CF	3	0 – 2	Ban %	28	20 – 36
C	0	0			

The cognitive sphere is characterized by an average number of global responses ( $G = 7$ ) and lower than expected detail response ( $D = 6$ ), index of intellectual capacity to deal with a situation globally, without, however, show strong practical sense. The reduced number of movements ( $M = 1$ ) and the Erlebnis typus extratensive (1/3) may indicate a thought oriented towards the external, rather than introspection. Is observed a tendency to produce formal responses ( $F=57\%$ ), but of these only 37% are of good quality. The thought, however, is not stereotyped, but sufficiently adequate to the group ( $A = 57\%$ ) and this is supported by a sufficient number of popular responses (ban = 28%). Lastly, the original two answers: pl. IX and X, both of bad shape, can indicate a complex that will be analyzed later. The affective sphere is characterized by an extratensive tendency (R to the last three tables = 42%). The control of emotions, however, is not effective and is expressed in the form of desire ( $FC = 0$ ;  $CF = 3$ ). The control of affectivity presents an insufficient number of movements ( $M = 1$ , pl. III), and a reduced number of  $G +$  (57%). Emerges some element of neurotic anxiety ( $FCHO = 1$ , pl. IV), which are verbalized in the card I and IV as a shock to dark colors. The adaptation is good: adequate number of popular responses (ban = 4), good adherence to reality ( $D = 42\%$ ), good reality Index (7/8). The type of interior life is extratensive and oriented to social

contacts. There is a good interest in the human and social sphere, but at the same time emerges tendency to passivity (passive movement) and inhibition (FM = 1), compatible with the condition due to deafness. Emerges, therefore, a structure tending towards adaptation but characterized by a certain inhibition, clear in the low number of responses (R = 14) and an infantile approach on the reaction to the tables. This inhibition could be of a defensive nature: its aim is to hold off the instinctual movements and chooses the passivity and dependence as a reaction to the outside world. These aspects could be due to the type of personality that can develop in a person who loses his hearing as a child. The protocol, however, shows slight signs of more active impulse, and desiring trends which may be attributed to the improvement of quality of life produced by the cochlear implant.

### *Qualitative analysis*

Our aim was to explore the contents emerged during the Rorschach administration, that best represent internal images, inner world and personality organization (qualitative analysis).



**Figure 1:** Table I – A carnival Mask

The answer given to the first card is the way in which the patient presents herself: the self image towards the trial and the psychologist. She evokes the image of the “carnival mask”. According to Jung (1970), the person is a mask that the individual brings to meet the needs of social conventions. It brings the functions assigned to it by society and is based on social expectations. This form often hides the true nature of the individual. The person is the public figure, those aspects that are revealed to the world or that the public ascribes to the individual, in opposition to the private personality that exists behind the social facade. The patient's answer suggests that she tends to present herself as a cheerful and

colorful mask.

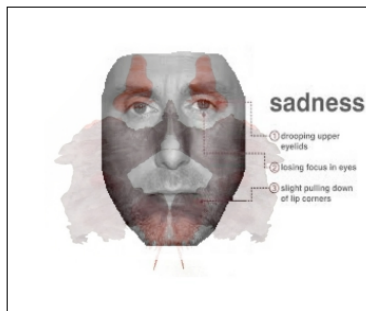


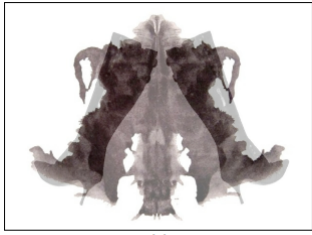
Figure 2: Table II – A sad person

On the second card seems to emerge a deeper aspect of personality: the response given is, in fact, “a sad person”. It's interesting that the emotion of sadness is elicited in the card that is considered the individual way of managing anger. There is an association between relational aggression and expressive reluctance and sadness regulation coping: sadness regulation coping moderates the association between expressive reluctance and relational aggression (Sullivan *et al.*, 2010). This could be the personal patient management of anger through sadness.



Figure 3: III – Two people talking, seated.

The third card describes the patient's internal image on the topic of interpersonal relationships. She clearly identifies two people positively interacting with each other, showing that his identity is quite defined. Nevertheless, she adds an inflected movement, which is indicative of a certain passivity in relationships.



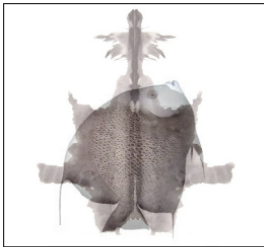
**Figure 4:** Table IV – Boots.

In the fourth card emerges for the second time the verbalization on dark colors, as an expression of difficulty to contain anxiety, which could come from a superegoic component.



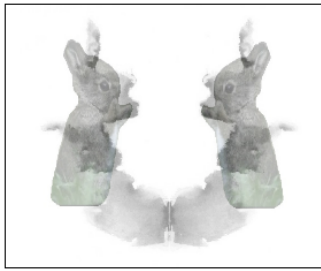
**Figure 5:** Table V – Bat.

Despite this, there is a good fit to the real (fifth card), supported by the human and the popular responses.



**Figure 6:** Table VI – A fish.

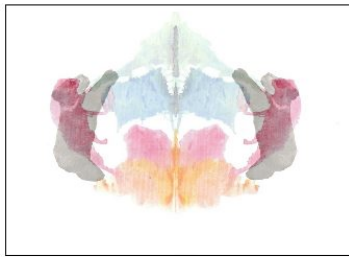
In the sixth card, the table of sexuality, appears the symbol of the fish. An important part of the symbolism of the fish regards the phallic shape, and the subsequent recall instinctiveness and sexuality that are present from the most ancient representations. This, therefore, coincides with a symbol of the collective unconscious.



**Figure 7:** VII – Two bunnies.

The seventh card is the mother table, it brings to mind images of the feminine and maternal relatedness. The patient identifies two small animals (bunnies) attracted by the shape of the ears. In this particular case it is very interesting that in connection with the mother image is called into question the sensory organ involved in deafness. The child's identity is structured through the function carried out by the mother. Curiously, the hearing is the first sense that develops already during pregnancy, so that at birth the child is already showing to recognize mother's voice. The psychic development of the child depends on the feedback that is provided by the maternal figure, which will shape the Internal working models of caregiving and security of attachment (George & Solomon, 1989). The patient has experienced this stage, since her deafness is post-verbal, in fact, her identity seems to be well structured and there are no evident signs of psychopathology.

The last three cards describe the world of the affections. The patient has some difficulty in managing emotions, despite demonstrating a desire for control. Even in this case, the most interesting aspect is given by the images evoked in these tables.



**Figure 8:** VIII – Animals that want to climb.

In the eighth card, the patient from a popular answer: "two animals that want to climb." This confirms her good degree of adaptation, for the recognition of two quadrupeds (Reality index), but a

slight inhibition, given by animal movement, or rather by the desire to move, as they want to climb and not "climb".



Figure 9: IX - Three ice cream flavors.

At the ninth card, appears the symbol of ice cream. The ice cream (original response) has an ambiguous symbolism that comes from its being sweet, soft and inviting (orality) and cold at the same time, with the ability to attract and, at the same time, to cool. The ice-crystals "freeze", block the emotions provoked by the situation, or they regress.



Figure 10.1: X - In the middle of the sea.

The last card, the picture that emerges describes the attitude of the person in respect of family and social sphere. The patient starts with a global response "in the middle of the sea", which is desirable, because it indicates the ability of synthesis as opposed to fragmentation.



Figure 10.2: Table X - Crabs.

Then locates the "crabs", the most popular response

for this table. Subsequently the interpretation shows a diminishing quality: "two jellyfish", shaped gelatinous and fluctuating, and "plankton" microscopic and indistinct (original responses).

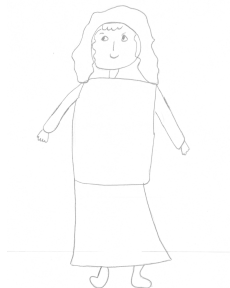


Figure 10.3: Table X – Jellyfishes.

The jellyfish, in particular, brings with it meanings similar to other aquatic animals provided with tentacles. The polip, the octopus, the squid, express the same symbolism of being "trapped" in a mortal embrace, or "burned," "bumped," near misses, captured, paralyzed (especially for the jellyfish through the power of his burning poison that is fatal in some species). The image of the jellyfish is related to the aspects that "collide" the sensitivity, that hurt, that block the will, which fascinate even harmful. Aspects that may belong even to the patient: parts of her personality that are "inner jellyfish."

### *Interpretation of drawings*

#### *Drawing A*



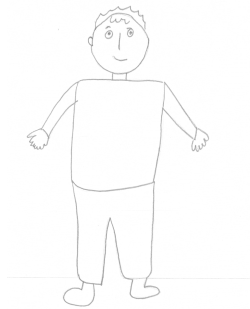
When invited to draw a person, the patient performs first a female figure (Figure 1). She represented a mom of 25 years, as if was drawing by one of her students,

**Figure 1** – Draw a person Test A.

describing the details from the head. The design appears higher than the sheet centre, and therefore closer to the sphere of abstraction and imagination, which is also confirmed by the evasive gaze.

There is a disproportion of the figure (small limbs, large trunk and chest), as if the affective sphere was predominant (chest) with respect to the ability of movement and autonomy (legs). In addition, the bust is schematic: the affects are as locked in a box and there seems to be a desire to rigidly control them. To this is accompanied by slight notes of anxiety (trait; hair). It also appears a certain amount of uncertainty (in the direction of the feet). The ears are absent and this confirms the projective hypothesis of non-representation of this sensory organ in the hearing impaired patients. Finally, in the relational sphere is manifested repressed aggression (closed fists), exactly as shown in the Rorschach responses.

### ***Drawing B***



Invited to draw the second figure of the opposite sex to the first, the lady represents a man with the same method of the first representation (Figure 2). In fact she illustrates a dad of 25 years, saying that “would be the ideal age of the parents of my young pupils”. The repetition in the two drawings of the same age, might somehow indicate the desire of the subject to be younger, since her real age is 36 years. Even here the drawing is schematic, rigid in movement and lacking of detail. One of the few elements that differentiates it from the first figure is the presence of only one ear, this also a possible projection of itself, in fact currently the patient has a fully functional ear thanks to the aid of the cochlear implant, while the other is located to address the pros and cons of the traditional hearing aid.

## ***DISCUSSION***

There are few studies on the psychological effects of the cochlear implant, and in particular on the projective representation of the subjects implanted, as the majority of studies have been more focused on cognitive (Pisoni, 2000) audiological and speech therapy aspects (Geers, 2000). This study aimed to investigate the psychological variables and in particular projective aspects, arising after the cochlear implant. It represents a development in the knowledge of the inner world of these patients.

From the study experience of Mento *et al.* (Mento *et al.*, 2003) the cochlear implant is not an ear transplant, but a prosthesis which can be experienced by users as a "good" and "bad" object at the same time. "Good" since it improves their quality of life, matches the desire to be normal; "bad" for the long-term rehabilitation, the need for surgery, the period of enforced silence before the activation of the system. An Italian study of Filippo & Bosco (Filippo *et al.*, 1999) took into account the elements of projective children (4-9 years) and adolescents (12-18 years) who underwent cochlear implant, through the use of three drawing methods: the human figure, the house and the tree. In the projective method of the human figure drawing has emerged the presence of an ever clearer sexual identification; a normalization of the size of the figure with respect to the sheet (most active reaction to social pressures); a gradual disappearance of stereotyped elements. This analysis showed that the cochlear implant usually has a positive impact in people's quality of life, in fact, from the drawings emerged a greater tendency to place the main figure within a specific context, the use of more details, but at the same time the lack of order or difficulties in interpersonal relationships. The latter aspect can be considered indicative of a greater awareness of personal limitations and understanding of reality. The scientific literature about the psychological and personological aspects on adult subjects with cochlear implant is reduced. Deafness in this case report has emerged when the patient was seven years so in her post-verbal stage. A child who becomes deaf may encounter several difficulties during the development, but the possibility of developing psychopathologies depends on the interaction of numerous factors (Meadow, 1976).

Compared to the stages of psychosocial development - conceptualized by Erik Erikson (Erikson, 1950) – at the time of the onset of hearing loss the

patient was in the stage of *industry vs. sense of inferiority*, which coincides with the Freudian latency (Freud, 1954).

At the interview, the patient reported that she was timid and anxious for her deafness experienced. The impact that the disease has on the individual can vary depending on personal resources, personality structure, favorable or unfavorable context, resilience. By their nature, children are more resilient than adults (Bernad, 1993), so the patient as a child was over time able to metabolize and integrate her deafness in a more balanced way compared to an adult after a violent and sudden hearing loss. From the qualitative and psychodynamics analysis of Rorschach protocol, it is clear that the patient has an adequate reality testing, demonstrating an integration condition of hearing loss in her personological assets. Despite the mild levels of anxiety, the patient shows a constant desire to adapt to the reality of her deafness condition. The latter form of internalization is highlighted by the absence of answers to the anatomical content, that would prevent disorders related to self-image. The women defense level tends to resort to the mechanism of shift, attesting to a level of neurotic organization, therefore there aren't signs of psychosis (Kenberg & Caligor, 1996).

From the observation of the two drawings of the human figure, it was possible to notice that the woman showed the unconscious resistances during delivery of both designs by engaging in a lack of confidence in herself and emotional lability, anxiety. It seems that in the history of this patient's cochlear implant had a positive role, such as improving her quality of life, in fact, she is a kindergarten teacher and she is satisfied with her job. Her identity is well-integrated, she is collaborative during the follow-up sessions, which certainly represents an ideal way to enhance the long-term benefits.

### **CONCLUSION**

Psychological and behavioral responses can influence surgery and postsurgical outcomes (Kiecolt-Glaser *et al.*, 1998) and problem-focused coping is positively correlated with overall health outcomes (Penley *et al.*, 2002). This induces to pay special attention on the evaluation of pre-implant candidates (Clark *et al.*, 1977, Sebastiani & Mastronino, 1986), in order to predict the outcome of surgery, reducing the risk of rejection or maladjustment of implant, that despite technological and medical advances,

are always possible. The deaf person must be sustained throughout the course of evaluation, selection and post-implantation phase in order to ensure an excellent clinical outcome, such as to avoid unnecessary costs, both economic (a cochlear implant costs thousands of Euros to the Italian Health Department) and personal (Mento *et al.*, 2003). Future studies in response to cases of therapeutic failure, depressive dynamics, non-acceptance of the device for the altered perception of their own voice, could aim at an extensive assessment. This will be possible by encouraging clinical trials with personality follow-up assessments, pre and post-implantation, in order to examine the actual personality changes due to the CI.

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