Facial aesthetics and perceived need for further treatment among adults with repaired cleft as assessed by cleft team professionals and laypersons

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SUMMARY The objectives of this study were to compare the ratings of professionals and laypeople with and without a cleft regarding the facial aesthetics of adult patients previously treated for orofacial clefting. The necessity for further treatment, as perceived by the respective groups, is also compared. The design of the study was a cross-sectional study. Professionals (two plastic surgeons, one dentist, one orthodontist, and one psychologist) and laypeople (one male and one female adult without a cleft and one male and one female adult with a cleft) were recruited to rate photographs of 80 non-syndromic cleft patients treated by the Australian Craniofacial Unit from 1975 to 2009. Facial aesthetics were measured by a visual analogue scale (VAS; 0–100 mm). High values indicated good aesthetics. Necessity for further treatment was also measured by a VAS (0–100 mm). High values indicated high perceived need for further treatment. The professionals rated facial aesthetics significantly lower and had a lower perception of need for further treatment than the raters with and without a cleft. The laypeople with a cleft rated facial aesthetics significantly higher and had a lower perceived need for further treatment than laypeople without a cleft. The non-surgical professionals rated facial aesthetics significantly lower and had a lower perceived need for further treatment than the surgical professionals. Differences exist in the facial aesthetics ratings and perceived need for further surgery between professionals and laypeople with and without a cleft. This should be considered when managing cleft treatment expectations.

Introduction

Orofacial clefts, including cleft lip with or without cleft palate, are among the most common visible birth defects, occurring in 1 of every 500–1000 live births worldwide (Murray, 1995). With a prevalence of 14.7 per 10,000 births in Australia (Lancaster and Pedisich, 1995), orofacial clefts are the most frequent congenital craniofacial deformities (Sinko et al., 2005). Cleft lip and palate irregularities vary greatly in terms of the width of the cleft and other characteristics, as well as the timing of surgery and technique of reconstruction. Treatment modalities may differ. Moreover, being the region where this deformity occurs, the face is a highly noticeable region of the body. In the long term, the treatment of cleft lip and palate should provide good aesthetic and functional results, including speech and occlusion (Jeffery and Boorman, 2001). An issue associated with the treatment of cleft lip and palate patients is that it may be up to two decades before the definitive results of treatment can be discerned. Due to the patient’s physical development and variability in the level of cooperation, it is difficult to predict the final outcome when the cleft treatment is started. It has been suggested that the final result can only be assessed when the patient is about 20 years old (Sinko et al., 2005).

In order to assess the final outcome of cleft treatment, studies would have to be conducted on adult cleft patients.

The relationship between appearance, social stereotyping, and expectations has been established as one of the most consistent research findings in social science (Adams, 1980; Berscheid, 1980; Berscheid and Gangestad, 1982; Langlois et al., 1987). Differences in facial appearance are readily noticeable and central to impression formation.

Anxiety and depression have been reported to be twice as prevalent in adults with clefts compared with normal controls (Ramstad et al., 1995). Dissatisfaction with facial appearance has been found to be a predictor of depression among adults with clefts and controls (Marcussen et al., 2002). Berk et al. (2001) examined social anxiety among adults with clefts and found significantly more social anxiety and avoidance among those with a cleft than among siblings and controls.

Facial aesthetics plays a significant role in the individual’s general perception of life, especially between the ages of 18 and 30 years (Jacobson, 1984; Harris and Carr, 2001). Facial appearance is one of the most relevant measures of success in treatment for cleft lip and palate (Asher-McDade...
et al., 1991); this can be judged by the patient’s satisfaction, as well as by the verdict of independent experts and laymen.

With regard to specific facial aesthetics, it was found that bilateral cleft lip and palate patients were significantly less satisfied with the appearance of the upper lip and nose (Oosterkamp et al., 2007). Marcusson and coworkers (2002) found that many adults with repaired clefts generally expect better results from surgery than they have obtained, particularly regarding the nose. It was also found that women rated their facial appearance significantly poorer than those of experts, with the discrepancy especially marked in women aged 24–30 years (Marcusson et al., 2002). A large proportion of adults with clefts expressed the need for further surgical treatment (Marcusson et al., 2002). In terms of a third party perspective regarding bilateral cleft lip nasal deformity correction, no significant differences have been found between the aesthetic ratings of professional and lay raters (Lo et al., 2002).

Not only is it important for the cleft patient to be satisfied with the treatment results, the perception of the layperson in the society with which they interact can influence how successful these individuals with clefts integrate in work, education, or social situations. A better understanding of the differences in facial aesthetics perceptions between professional members of a cleft team, laypersons and cleft individuals, would be an invaluable aid in cleft treatment planning, discussion of treatment outcomes with the patient, as well as management of patient expectations in order to achieve optimal treatment results and patient satisfaction.

To the best of our knowledge, there has been no study that has compared perceptions of facial aesthetics in treated adult cleft patients between a panel of professional and laypeople raters. Nor have there been any studies on the difference in perceptions between a cleft affected layperson and a layperson without a cleft, as well as studies on any gender differences between these groups. The aims of this study are:

1. To evaluate the opinions of professionals and laypeople regarding the facial appearance of adults treated for orofacial clefting.
2. To evaluate the perceptions of professionals and laypeople on whether further surgery is required to correct the facial appearance of adults treated for orofacial clefting.
3. To investigate whether there are differences in opinion and perceptions within the different professional groups as well as between laypeople with and without a cleft.
4. To investigate whether there are gender differences within the laypeople with and without a cleft.

Materials and methods

Participants were recruited from cleft patients treated at the Children, Youth and Women’s Health Service (CYWHS) under the Australian Craniofacial Unit over the last 34 years (1975–2009). Participants all had surgery to correct their unilateral or bilateral cleft lip, cleft palate, cleft lip and palate, and to correct jaw size discrepancies. Inclusion criteria were non-syndromic cleft patients aged 18 years or over who had completed their cleft treatment at this centre. It was not possible to conduct a power calculation to determine the optimum sample size, due to a finite number of patients with cleft available for the study. We attempted to contact all the patients with cleft whose details had been recorded. With the written consent of the patients and CYWHS Human Research Ethics Committee approval (REC2120/11/11), photographic records were obtained. The photographs were taken following the completion of all treatment including orthognathic surgery as well as revision surgery. The photographs were standardized using computer software (Adobe Photoshop Windows PC version CS8.0) for size, background, and brightness. For each patient, a frontal, left profile, and right profile view were presented. These images were cropped, rescaled, and projected onto a screen to be assessed by a panel of expert and layperson raters. The photographs were anonymized and a random number was assigned for blinded analysis by one researcher (PF). The raters were asked to rate the photographs according to attractiveness of the patient’s nose, lips, and overall facial appearance. The raters were also asked whether they thought further surgery was required. Both measures were rated on a visual analogue scale (VAS).

Facial aesthetics rating

The VAS was preferred over the Likert scale because the former employs a 100 mm scale with a broad range of distinctive possibilities, whereas the latter uses ratings from 1 to 5 or from 1 to 10 (Sinko 2005). According to Jaeschke et al. (1990), both methods of presenting response options show the same level of construct validity and responsiveness. The use of the VAS method has been shown to yield reproducible and valid results when assessing facial aesthetics (Kiekens et al., 2005). In this study, high scores indicate good aesthetics for the first measure and high perceived need for further surgery for the second measure. Due to logistical challenges, it was not possible to conduct a reliability study.

The nine members of the rating panel comprised health professionals (a non-surgical group and a surgical group), adult laypeople above the age of 18 years (a laygroup without cleft and a laygroup with cleft). The rating members were recruited with a purposive sampling method. The groups are as follows:

1. Non-surgical group: a male orthodontist, a female dentist, and a female psychologist.
2. Surgical group: a male plastic surgeon with more than 5 years of cleft experience and who regularly performs cleft surgery at the Australian Craniofacial Unit and a
female plastic surgeon with little involvement with cleft surgery.

3. Laypeople with cleft: a female and a male volunteer above the age of 18 years. Both volunteers were recruited from the Australian Craniofacial Unit.

4. Laypeople without cleft: a female and a male volunteer above the age of 18 years. Both volunteers were recruited from the University of Adelaide staff.

The professional raters were not involved in the treatment of the cleft patients who were assessed but had clinical experience with cleft patients. Assessment of facial aesthetics using this method has been conducted in several studies and has been shown to be both valid and reliable (Howells and Shaw, 1985; Tobiasen et al., 1991; Lo et al., 2002; Marcusson et al., 2002; Sinko et al., 2005; Tatarunaite et al., 2005; Kenealy et al., 2007). Other investigations also confirm that a high level of agreement on facial aesthetics exists among panels with different backgrounds (Lundström et al., 1987; Peerlings et al., 1995).

**Statistical analysis**

Mean scores were generated from the VASs for each of the components measured (nose, lips, and face), with high scores indicating good aesthetics for the first measure and high perceived need for the second measure. The following groupings were made: professional (dentist, orthodontist, psychologist, and two plastic surgeons) and lay [two laypeople without a cleft (male and female), two laypeople with a cleft (male and female)]. The professional group was further subdivided into a nonsurgical group: dentist, orthodontist, and psychologist, versus a surgical group: two plastic surgeons (one with extensive cleft experience and the other with less cleft experience. This would enable comparisons of ratings between surgeons with different backgrounds). Students’ t-tests were used to compare group scores, with findings considered statistically significant when $P$ values were 0.05 or less.

**Results**

Of the 112 patients who satisfied the recruitment criteria, 88 patients agreed to participate, a response rate of 79 per cent. Three patients declined to participate in the study, 2 patients were deceased, and 19 patients were not contactable. Photographs of 80 participants were used for the facial aesthetics assessment because there were incomplete photographic records for five patients and three patients did not have standardized profile photographs. Of the 80 participants, 41 were female and 39 were male. The breakdown of the cleft cohort by diagnoses is shown in Table 1. The participants ranged from 18 to 64 years of age. Mean age was 31 years (SD = 11.34) and the median age was 29 years.

The descriptive statistics of the basic data characteristics are shown in Table 2. The scores were normally distributed. The mean scores for the aesthetic evaluations by the raters of the 80 adults with treated clefts are shown in Table 3. In the attractiveness ratings, the professionals rated the treated adults with cleft as significantly less attractive in all

<table>
<thead>
<tr>
<th>Type of Cleft</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral cleft lip and palate</td>
<td>44</td>
</tr>
<tr>
<td>Unilateral cleft lip and palate</td>
<td>33</td>
</tr>
<tr>
<td>Cleft palate</td>
<td>1</td>
</tr>
<tr>
<td>Cleft lip</td>
<td>1</td>
</tr>
<tr>
<td>Submucous cleft palate</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 2** Descriptive statistics of the basic data characteristics. SE, standard error; SD, standard deviation.

<table>
<thead>
<tr>
<th>All1Nose</th>
<th>All1Lips</th>
<th>All1Face</th>
<th>All2Nose</th>
<th>All2Lips</th>
<th>All2Face</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Mean</td>
<td>50.4</td>
<td>50.1</td>
<td>55.9</td>
<td>51.7</td>
<td>51.2</td>
</tr>
<tr>
<td>SE</td>
<td>1.5</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Median</td>
<td>49.7</td>
<td>49.9</td>
<td>55.2</td>
<td>52.5</td>
<td>50.6</td>
</tr>
<tr>
<td>Mode</td>
<td>51.0</td>
<td>50.9</td>
<td>42.2</td>
<td>54.0</td>
<td>38.9</td>
</tr>
<tr>
<td>SD</td>
<td>13.7</td>
<td>14.7</td>
<td>14.4</td>
<td>14.4</td>
<td>13.6</td>
</tr>
<tr>
<td>Minimum</td>
<td>22.6</td>
<td>20.3</td>
<td>26.8</td>
<td>22.3</td>
<td>21.1</td>
</tr>
<tr>
<td>Maximum</td>
<td>80.8</td>
<td>81.4</td>
<td>81.3</td>
<td>78.7</td>
<td>82.6</td>
</tr>
</tbody>
</table>

All1Nose = how attractive would you rate your nose. Scores are in ‘millimetres’, with a possible range of 0–100. Higher scores reflecting ‘very attractive’. All1Lips = how attractive would you rate your lips. Scores are in ‘millimetres’, with a possible range of 0–100. Higher scores reflecting ‘very attractive’. All1Face = how attractive would you rate your face. Scores are in ‘millimetres’, with a possible range of 0–100. Higher scores reflecting ‘very attractive’. All2Nose = do you think further surgery is required to change appearance of your nose. Scores are in ‘millimetres’, with a possible range of 0–100. Higher scores reflecting ‘strongly agree’. All2Lips = do you think further surgery is required to change appearance of your lips. Scores are in ‘millimetres’, with a possible range of 0–100. Higher scores reflecting ‘strongly agree’. All2Face = do you think further surgery is required to change appearance of your face. Scores are in ‘millimetres’, with a possible range of 0–100. Higher scores reflecting ‘strongly agree’. 


Table 3  Mean aesthetic evaluations of adults with treated clefts (scores are in ‘millimetres’, with a possible range of 0–100; higher scores reflecting ‘very attractive’)

<table>
<thead>
<tr>
<th>How attractive would you rate the following</th>
<th>Nose, mean (standard error)</th>
<th>Lips, mean (standard error)</th>
<th>Face, mean (standard error)</th>
</tr>
</thead>
</table>
| Professional
| (n = 5)                                   | 44.5 (1.7)*                  | 46.4 (1.6)*                  | 50.0 (1.4)*                  |
| Lay; cleft and non-cleft
| (n = 4)                                   | 57.7 (1.7)                  | 55.1 (1.8)                  | 63.1 (2.4)                  |
| Lay; cleft
| (n = 2)                                   | 69.7 (1.6)*                  | 66.2 (1.9)*                  | 72.2 (1.5)*                  |
| Lay; non-cleft
| (n = 2)                                   | 45.7 (2.4)                  | 46.1 (2.2)                  | 54.1 (4.2)                  |
| Cleft; female
| (n = 1)                                   | 67.6 (1.9)*                  | 66.2 (2.1)                  | 76.1 (1.1)*                  |
| Cleft; male
| (n = 1)                                   | 72.8 (2.2)                  | 66.2 (2.4)                  | 68.3 (2.3)                  |
| Professional; dentist, orthodontist, and psychologist
| (n = 3)                                   | 42.9 (1.7)*                  | 40.1 (1.8)*                  | 45.3 (1.6)*                  |
| Professional; plastic surgeons
| (n = 2)                                   | 49.0 (1.6)                  | 51.0 (1.7)                  | 57.1 (1.4)                  |

*P < 0.05.

Table 4  Mean perceived need for surgery for adults with treated clefts (Scores are in ‘millimetres’, with a possible range of 0–100; higher scores reflecting ‘strongly agree’)

<table>
<thead>
<tr>
<th>Do you think further surgery is required to change appearance of the following</th>
<th>Nose, mean (standard error)</th>
<th>Lips, mean (standard error)</th>
<th>Face, mean (standard error)</th>
</tr>
</thead>
</table>
| Professional
| (n = 5)                                   | 46.9 (2.1)*                  | 45.2 (2.0)*                  | 39.1 (1.8)*                  |
| Lay; cleft and non-cleft
| (n = 4)                                   | 57.8 (1.5)                  | 58.7 (1.3)                  | 52.6 (1.3)                  |
| Lay; cleft
| (n = 2)                                   | 46.3 (1.4)*                  | 46.2 (1.2)*                  | 39.7 (1.3)*                  |
| Lay; non-cleft
| (n = 2)                                   | 69.3 (2.5)                  | 71.2 (2.3)                  | 65.5 (2.5)                  |
| Cleft; female
| (n = 1)                                   | 28.3 (2.1)*                  | 30.4 (2.2)*                  | 18.1 (1.4)*                  |
| Cleft; male
| (n = 1)                                   | 64.4 (2.5)                  | 62.0 (2.3)                  | 61.4 (2.5)                  |
| Professional; dentist, orthodontist, and psychologist
| (n = 3)                                   | 37.3 (2.3)*                  | 41.8 (2.4)*                  | 34.1 (2.1)*                  |
| Professional; plastic surgeons
| (n = 2)                                   | 57.1 (1.9)                  | 54.6 (2.0)                  | 46.6 (1.7)                  |

*P < 0.05.

The mean scores for the perceived need for further surgery of the 80 adults with treated clefts are shown in Table 4. There was statistically significant disagreement between the professional raters and the lay raters regarding perceived need for further surgery to correct all components of the face. The professional raters perceived further surgery was not required to correct all components of the face, while the lay raters perceived the opposite. Among the lay raters, those with a cleft considered further surgery was required less so than the raters without a cleft to correct all components of the face. Interestingly, there was significant disagreement between the female and male raters with a cleft, with the female rater perceiving that further surgery was required less often than the male raters to correct all components of the face. There was also significant disagreement among the professional raters. The non-surgical professionals (dentist, orthodontist, and psychologist) considered further surgery to be less needed to correct all components of the face compared with the surgical professionals (plastic surgeons).

Discussion

The findings of the present study found significant differences in the perceptions of facial aesthetics between professionals and laypeople. The treated cleft cohort was rated as significantly less attractive by the professionals compared with laypeople, indicating that the professionals have a different concept of facial aesthetics. This is in contrast to previous studies where no difference in ratings was shown between the professionals and the laypeople (Tobiasen et al., 1991; Lo et al., 2002; Sinko et al., 2005). The difference between the previous findings and those of the present study could be due to the difference in rating groups. The rating panel in the study by Lo et al. (2002) comprised five surgeons and five laypeople, whereas the raters in the present study included other professionals such as an orthodontist, dentist, psychologist, and the lay raters included cleft affected individuals. This difference in rating panel composition may have influenced the aesthetic ratings. However, the rating panel composition of the present study may produce a more representative aesthetic rating as it takes into account the different professionals of a cleft team whom, with their different expertise, may influence the type and or course of treatment, as well as the general public’s perception. The inclusion of the raters with a cleft in the present study provides further insight into the perceptions of the person ultimately affected by the cleft treatment.

The ratings by laypeople with a cleft were significantly higher than those laypeople without a cleft. Individuals with a cleft are familiar with orofacial clefting and its effects on facial appearance and may not perceive it in as negative a light. The small number of raters with a cleft meant that their ratings may not be representative of that cohort. Further investigations with a greater number of raters with a cleft are warranted, in order to test the validity of our findings.
Attractiveness ratings were significantly higher from the female than male rater with a cleft. No previous studies have investigated the perceptions of an individual with a cleft on facial aesthetics. Further investigations are required to gain insight into the gender difference in perceptions.

The ratings from the surgical members of the professional group were significantly higher than that of the non-surgical members. In the study by Sinko et al. (2005), there was no significant difference between medical and nonmedical raters, although it was unclear which members of their rating panel were considered ‘medical’ and which were ‘non-medical’. A possible explanation for the present study’s findings may be that the surgical professionals are experienced in dealing with the surgical corrections of clefts and hence may rate the cleft facial aesthetics higher in light of the potential complications and technical difficulties in achieving optimal aesthetic results.

The professionals deemed significantly less need for further surgery than the laypeople. However, it should be noted that the mean score of the laypeople was 52.6, which indicated that they neither agreed nor disagreed that further surgery was needed. Sinko et al. (2005) found no difference between the medical and non-medical members of the rating panel in their perception of the need for further surgery, and the rating panel tended to deem further treatment unnecessary. The difference in the present findings may be due to the difference between the size and composition of the rating panels. In the current study, there was a greater number of laypeople and nonmedical raters, as well as the inclusion of laypeople with clefts. In the former study, there were no laypeople, only non-medical members of the assessment panel. A possible reason for the professionals’ lower perceived need for further surgery may be due to their better understanding of the limitations of surgery in correcting facial deformities. In many instances, despite having rated facial aesthetics lower, the professional members of the assessment panel may have deemed that realistic aesthetic results have been achieved for the cleft patients, hence the higher disagreement on the need for further surgery.

The laypeople with clefts deemed further surgery to be needed significantly less than laypeople without clefts. This was consistent with their significantly higher attractiveness ratings. The non-cleft laypeople had the highest agreement that further surgery was required compared to the other groups of raters, which was also reflected in their low attractiveness ratings. It has been suggested that many patients with clefts tend to be tired of seeking further treatment (Sinko et al., 2005), especially having experienced a protracted course of cleft treatment from childhood to adulthood. It may be possible that the cleft laypeople on the rating panel projected their own experiences to the assessment of the cleft cohort, hence the low agreement with regard to the need for further surgery.

The female rater with a cleft deemed further surgery to be needed significantly less than their male counterpart. This was also reflected in her higher attractiveness ratings. This finding contrasts with previous findings where the female participants with a cleft expressed a desire for further treatment twice as often as their male counterparts (Sinko et al., 2005). However, the previous findings were based on the self-reports of individuals with clefts, which may not apply to the individual’s perception of other patients with clefts. Further studies regarding the perception of an individual with a cleft of other patients with clefts are warranted.

In the current study, 80 of the initial 112 patients were included in the aesthetic assessment. It may be argued that non-participants may have somehow skewed the ratings from the panel of raters. Three of the patients declined to participate. It is possible that their refusal was due to the adverse outcome of their cleft treatment and their inclusion in the study may have produced significantly lower aesthetic ratings. Alternatively, they may not have any problems from their cleft treatment and their inclusion may have produced significantly higher aesthetic ratings. Future investigations with a higher response rate would overcome this confounder.

It is also acknowledged that the aesthetic ratings and the perceived need for further surgery were potentially skewed due to the heterogenous composition of the cleft participants. A patient with a unilateral cleft is more than likely to be rated higher aesthetically and have a lower perceived need for further surgery compared to one with a bilateral cleft. It would have been ideal to have a homogenous cleft cohort in order to standardize the ratings. However, the limited number of participants prevented comparison of the scores by cleft type.

It has been shown that the composition of the rating panel has a large impact on the aesthetic evaluation of adolescent faces, using photographs and a VAS (Kiekens et al., 2007). Although Kiekens et al. looked at adolescent faces without a cleft, the findings may still apply to the current study on adults with treated clefts. Due to the difficulty encountered during recruitment of volunteer raters in this study, the number of members within each subgroup of the rating panel was small. As such, the aesthetic ratings and perceived need for further treatment may not be fully representative of the respective subgroups. However, the size and composition are comparable to, or greater than, previous studies (Lo et al., 2002; Marcussen et al., 2002; Sinko et al., 2005). It should be noted that there was a large number of ratings made by each rater, which contributed to the strength of the current study.

Conclusions
Differences exist between professionals who are part of the cleft treatment team, laypeople, and individuals with a cleft.
in their perception of facial aesthetics of treated adult cleft patients. The professionals rated the facial aesthetics as significantly less attractive compared with the laypeople with and without clefts, although further surgery was also deemed less necessary. The non-surgical professionals reported lower facial aesthetics ratings and also deemed further surgery to be less necessary compared with their surgical counterparts. Among the laypeople, the members with clefts reported higher facial aesthetics ratings and had a lower perception of necessity for further surgery compared with the non-cleft laypeople. In addition, the female layperson with a cleft reported higher facial aesthetics ratings and also deemed further surgery to be needed less than the male layperson with a cleft.

Since there are very few equivalent studies, comparisons of the findings from the present study have been made with some extrapolation to previous studies. This emphasizes the need for further studies into the differences between perceptions of the cleft and non-cleft affected individuals and the professionals involved with the cleft treatment.

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