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A descriptive examination of the impact of sternal scar formation in women

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Abstract

Formation of abnormal scars is a significant source of morbidity following sternotomy. We undertook a descriptive exploratory mixed methods study of women ($n=13$) who participated in the Women's Recovery from Sternotomy Trial to examine the: (1) qualitative impact of the cosmetic result of sternotomy, and (2) quantitative association between subjective satisfaction and objective ratings of the sternal scar. Conventional content analysis was used to analyze the data generated from semi-structured interviews. Though the participants appreciated that having the scar was a cost of reaping the benefits of having cardiac surgery, they were not well prepared to learn to live with the scar. The scar was a poignant personal reminder that they had a health problem and underwent a distressing surgery, and it often rendered them feeling less attractive. The scar also had a public presence that they perceived rendered judgment from others. There was little association between the participants' subjective satisfaction (rated on a likert-type scale) and the objective scar rating using the Beausang Clinical Scar Assessment ($r=0.348$, $p=0.294$). The subjective perception of the sternal scar is of importance to women. Thus, appropriate preparation, post-operative counseling and support regarding the sternal scar are warranted.

Keywords: Description; Sternal scar; Women

1. Background

Approximately one third of cardiac surgeries are performed on women [1,2]. A significant source of long-term morbidity following sternotomy is the tendency to form abnormal scars (i.e., scars that are raised, reddened, itchy, irregular, and disfiguring) [3,4]. Previous research regarding cardiac patients' attitudes toward their surgical scars has been undertaken with adults who had surgery at a young age (predominantly in childhood and adolescence) for congenital heart anomalies [3,4]. In one such study, Kantoch et al. [3] found 50% (41/82) of patients who had undergone median sternotomy had an objectively determined 'wide or keloid' scar. Crossland et al. [4] found nearly one quarter (49/201) of similar patients 'did not like' or 'hated' their sternotomy, thoracotomy or both scars. Moreover, significantly more women than men (35% versus 14% respectively, $p=0.0012$) 'did not like' or 'hated' their surgical scar. Despite the potential visibility of sternal scars and the increasing trend for women to undergo cardiac surgery [1,2], the early impact of the cosmetic result for adult women undergoing cardiac

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surgery is only beginning to be appreciated and has not been explicitly explored.

The aim of the Women's Recovery from Sternotomy (WREST) Trial was to examine the effect of women's use of a special undergarment following first-time sternotomy on pain, discomfort, as well as return to function [5]. A photographic examination of the quality of participants' sternal scars was undertaken in WREST-Scar; a sub-study of WREST. Over the course of data collection and speaking with women about their sternal scars, it became apparent that there was a personal impact resulting from having a sternal scar and women's subjective perceptions of the sternal scar might differ substantially from others' objective ratings. Thus, in the companion sub-study described here (WREST-Scar-Qual), we examined women's thoughts and feelings about having a sternal scar, as well as the associations between observers' ratings and the participants' level of satisfaction with their sternal scars.

2. Methods

This was a descriptive exploratory mixed methods study [6] in which both qualitative and quantitative methods [7,8] were used. Qualitative descriptive studies are based on the tenets of naturalistic inquiry and typically have an "eclectic" means of sampling, collecting and analyzing data, as well as reporting of findings [7]. Sandelowski [7] contends that findings in qualitative descriptive studies are "largely unadorned (i.e., minimally theorized or otherwise transformed or spun), (p.337)". Quantitative data may also be collected in descriptive exploratory studies [6–8] to, as in this case, supplement and extend the findings of the qualitative element of the study. Ethics approval was obtained from the Health Research Ethics Boards of the participating universities/health regions.

2.1. Sample

Participants from WREST, who had agreed to potential further study, were contacted to determine their willingness to take part in WREST-Scar-Qual. Informed consent was obtained from willing participants. Sampling in qualitative work is purposive [7]. Women were asked to participate based on their characteristics (i.e., age, marital status, habitation, employment status), responses (i.e., perception of scar, quantitative response regarding satisfaction with the sternal scar—see below) as well as particular perceptions as they emerged (i.e., those related to intimacy were explored with married or partnered women). Sampling continued until no new information or insights were illuminated.

2.2. Data collection

Demographic and clinical data about the participants were collected in the original trial. These data were confirmed with the participants at the outset of the interview. Semi-structured interviews were then undertaken in-person or by telephone (KMK, JM-D, PL), as desired by the participant; were audio-recorded; and were usually completed in less than 1 h (ranging from 30 to 90 min in length). Participants were initially asked 'On a scale of zero to ten, with zero being the lowest and ten being the highest, how satisfied are you with your sternal scar?'. We were thus able to purposively sample women who had a variety of demographic characteristics and opinions about their sternal scars.

Sandelowski [7] identifies that "data collection in qualitative descriptive studies is typically directed toward discovering the *who*, *what* and *where* of events or experiences, or their basic nature and shape" [7] (p.338). To achieve this, we used Spradley's [9] work, to assist in conducting the semi-structured interviews aimed at illuminating the impact of having a sternal scar for women. Spradley used the terms 'grand tour' (general in nature — to begin to get a sense of the big picture) and 'mini tour' (more specific — to begin to get more detail) to describe interview questions. The 'grand tour' questions were broad to assist the participant to discuss the topic (i.e., What was it like for you to see your incision? What has it been like for you to have a scar?). Thereafter, 'mini tour' questions were used to help the participant focus on smaller units of the experience (i.e. What are the words that you use to describe your scar? Have you had to make any changes or accommodations in your life related to the scar? What are they? How does that sit with you?). As the concurrent data analysis proceeded, questions evolved to enable clarification of emerging categories.

2.3. Data analysis

The audio-taped interviews were transcribed verbatim for analysis. Using conventional content analysis, [8] the analysis process began upon completion of the first interview. Conventional content analysis is "generally used with a study design whose aim is to describe a phenomenon…when existing theory or research literature…is limited." [8] (p. 1279) According to Sandelowski [7], content analysis is the 'analysis strategy of choice' for qualitative descriptive studies. Members of the research team (KMK, JM-D, PL) individually read transcripts, identified salient elements, and grouped them into categories. Team meetings were held to build consensus regarding the emerging findings. We did not intend to develop a "conceptual or otherwise highly abstract rendering of the data" (i.e., theory) [7] (p. 335), but only to convey a comprehensive descriptive summary of the thoughts, feelings and insights offered to us by the participants [7].

Study participants were characterized (using descriptive statistics) using the demographic and clinical data collected in the original trial. If the women participated in the WREST-Scar sub-study, their scar was assessed using the Beausang Clinical Scar Assessment [10]. This is a validated scale with five subscales based on the quality of the scar's colour, contour, distortion and texture, as well as global assessment.

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Table 1
Participant characteristics

Participant (pseudonyms)	Subjective satisfaction scar score [a]	Objective scar score [b]	Age at surgery (years)	Time since surgery [c] (years)	Marital status [d]	Habitation [e]	Employment outside the home
Andrea	8	13	30	3	S	A	Full-time
Brenda	0	8	68	2.5	S	AC	Part-time
Cecile	2	22	53	2.5	S	A	Disability
Donna	3	– –	49	2.5	M	WSC	Homemaker
Elaine	3	– –	49	3	M	WSC	Part-time
Fran	2	14	71	3.25	M	WS	Retired/homemaker
Georgia	2	5	37	3.5	M	WSC	Full-time
Helen	3	9	46	1.5	M	WSC	Full-time
Ingrid	1	11	59	2.5	M	WS	Retired/homemaker
Jean	1	17	79	2.25	S	AC	Retired/homemaker
Karen	3	10	53	3.75	S	A	Full-time
Linda	3	18	45	3.75	M	WS	Full-time
Marilyn	5	21	48	3.5	M	WSC	Homemaker

[a] Likert-type scale responding to question 'How satisfied are you with your sternal scar'. The scores were reverse-coded to align with Beausang Clinical Scar Assessment (0=most satisfied and 10=least satisfied)?
[b] Beausang Clinical Scar Assessment, [11] (5=clinically excellent scar and 28=clinically poor scar); – did not participate in WREST-Scar, therefore no score.
[c] Rounded up to the next 0.25 year.
[d] S=Single/Widowed/Divorced; M=Married/Common Law.
[e] A=alone; WS=with spouse; WSC=with spouse and child(ren); AC=with adult child.

The possible range of scores for this measure is 5 (indicating a clinically excellent scar) to 28 (indicating a clinically poor scar). The participants' ratings of their sternal scar were reverse-coded according to their score (0=most satisfied, 10=least satisfied) to correspond with the direction of responses from the Beausang Clinical Scar Assessment. We examined statistical associations between the participants subjective scar scores and objective scores using a Pearson Product-Moment Correlation.

3. Findings

Thirteen participants (of 14 approached) contributed to this sub-study (Table 1). Their ages ranged from 30 to 79 years. Time since surgery ranged from 1.5 to 3.75 years. Eight of the thirteen women were married or living common-law, and two of the single women were in committed, but not co-habitating relationships. Finally, a near equal distribution of participants was either employed outside the home (full- or part-time) or retired/homemakers.

Initially, most of the participants were shocked to see their sternal scar. Some women were concerned that the incision would 'open up'. Karen recalled thinking,

> It's pretty ugly. [I soon] worried about…what will be left when the healing is complete. Will it be a nice white line that nobody's going to notice? Or will it be something that people will comment on. I was concerned about the comments.

Some of the participants identified that seeing the scar brought them to a genuine realization that indeed, they had a 'heart problem'. Elaine shared, "…it's definitely a reminder that you have a [health] issue."

When the participants saw their scar, they responded with anger or amazement. One woman, declared she was distraught to see what 'they' had done to her. Another woman was angry at 'them' for 'tearing open' her chest. Other participants were astounded at what the surgeons had done for them. Cecile reflected "…and to think that they opened…[me] up like that. It's just mind boggling…They saved…[my] life." Almost uniformly however, the women declared they were not ready for, or did not understand what was going to happen to their body. Georgia summed up her experience like this: "I won't say the word 'devastating' but, it was shocking. It took me a few days to actually be able to look at….you know, look at myself, in the mirror." After absorbing the initial impact of seeing the scar, the participants described a pattern or process of 'opening up' or 'sharing' the scar with others. This pattern mimicked how their world expanded as they recovered from surgery. If the process became hindered at one point or another, the women seemed less able to expand their sharing any further. First, the participants needed to see the scar and get used to 'wearing' it. Then the women asked or allowed their partners and family members to see it. Finally, if met with acceptance, they were more ready to share the scar with others.

Some participants described the depths to which they went to hide the scar from themselves and others. Andrea described how she did not look at her naked body for many months following the surgery. Other participants described covering the scar with makeup or clothing. Elaine said " I know for the first year, particularly, and probably two years, I was very conscious…to cover it (the scar)…or not purposively expose the scarred area." Many of the women identified a solitary process of 'coming to terms' or 'learning to live' with having a scar. Andrea said "This is my struggle to manage…No one else can do it for me."

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Some of the women described being very sensitive to sharing the scar with their partners. Cecile said, "I have a boyfriend, and…it bothers me…it doesn't bother him a bit, it bothers me more (for him to see the scar)!" Most of the women reported that their partners had been very supportive and kind when seeing the scar. Though trying to be sympathetic to his wife's concern about her scar, Donna recalled her husband said "…the scar was awful looking…He usually says 'Boy did they ever make a mess of your chest!'" This comment was viewed as hurtful, rather than sympathetic. Conversely when teenaged and older children first had the opportunity to see the scar, their honest, but unmeasured responses (i.e., 'This is gross, Mom!') or their refusal to view the scar was met with a more protective response by their mothers. One mother said, "They just want to know that I'm healthy and that I'm able to do things and that I'm going to be around for a while".

Some of the women described how having the scar affected their self-perceptions — wearing the scar was 'one more thing' that rendered them feeling less attractive. Married or partnered women often described feeling less sensual, despite what their husbands or partners told them. Helen shared

> …I'm finding it very hard sometimes to be with my husband…and it has a lot to do with the scar, and…his reaction, I guess. Not that he's said it's ugly or anything like that, but I just, I guess….that I don't want him to see me with it…when we're in bed.

Andrea described her partner said that having the scar 'didn't matter'. However, Andrea and others believed "it *does* matter".

Unanimously the women declared 'I don't like it when people stare'. Some of the women continued to wear clothes that hid the scar. Others wore whatever clothing felt comfortable to them. Elaine recounted the following:

> …Now as things are fading and I guess I'm getting used to the…look of it, it's just part of me now…I'm not worrying about hiding it so much…[Yet] just last week…I had a nice little sweater on that was a little bit lower than some of the things that I had been wearing, and it did expose some of my scar. And I noticed … when I spoke to at least three different people…you know how you can tell that their eyes avert down to… well, I'm sure that they were looking at my scar…

Women like Karen who had surgery for congenital or rheumatic heart disease, worried that people would view the scar and make judgment that they had 'not taken care' of their health. This was another reason to keep the scar covered. However, some women chose to use the scar as a teaching tool. One woman identified when other women see the scar, they learn that 'women CAN have heart disease'. Another participant identified that the scar serves as a warning to her female family members that 'it' could happen to them too! Cecile said "I think that people ought to be aware…(that) more and more women (are) having heart problems."

The participants often postulated that their responses and thoughts regarding their sternal scar would likely be different if they were at another age or stage of life. The younger women assumed that having a sternal scar would render a lesser impact for older women. Andrea said "It's different for me at (less than 40 years)…than it is for someone, a woman of 75. It's different. It's a part of my sexuality." Georgia reflected "…as a woman… it might have been different if I was 67, sure, but at 37, … I still want to be able to wear a bathing suit, and … shirts that, you know, might at some point, you know expose at least part of my chest." Karen, single now and in mid-life, described that the scar confirms that she's "middle-aged".

The women described that they became 'used' to having/seeing their sternal scar over time. Moreover, time occasionally brought hope that the aesthetics of the scar would continue to improve. Importantly, many of the women could come to terms with having the scar and declare, as Andrea did, that "it does not define me…it is just a part of 'me' now…" For some women, the scar represented much more than having the surgery. Karen said,

> When I look at myself in the mirror, I think of all that I have come through…When I look at the scar, I think 'Well I'm here. So there's a reason. So…what am I doing with my life? And going forward, what contribution will I make?…It could have gone the other way. It's possible that I wouldn't be here any more.' But obviously I still have work to do."

Other pragmatic women believed, as one woman put into words, 'I accept it, but I don't have to like it'.

After several months since having the surgery, the sternal scar served a public or private reminder for many of the participants. It served as a reminder that they: were very ill and possibly close to death; had been through a great ordeal (either the surgery itself or beyond the surgery); had a defect corrected or remained with a weakness; and needed to take care to avoid more surgery. Some of the women called the scar their 'battle scar' referring to 'winning the battle of heart disease'. Others called the scar their 'badge of honour'. Some simply chose to keep the scar and its meanings to themselves.

Finally, the participants contextualized their thoughts and feelings regarding their sternal scar by identifying that they felt fortunate to be alive. They unanimously identified that because of having the scar (in other words having the surgery), they were alive and able to talk about what they had come to recognize as a new part of themselves. The alternatives associated with not having the surgery (and thus not having a sternal scar) were untenable to them. Some participants asked 'What choice did I have?'. Brenda said

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"[I] don't worry about this scar any more. It'll heal. [I] just thank God that…[I'm] alive and that I made it through." Georgia concurred. She said "I'm glad to be alive. So, I guess if…[the scar] is one of the by-products of life, then I'll take it."

3.1. Association between subjective satisfaction and objective ratings of the scar

The participants used the words: red rope, bubbles, bumps, lumpy, raw, awful, beautiful, and like a tiny white line, to describe their sternotomy scar. As seen in Table 1, the study participants' rating of satisfaction with their sternal scar ranged from 0 (most satisfied) to 8 (not satisfied) and the Beausang Clinical Scar Assessment [10] scores ranged from 5 (indicating a clinically excellent scar) to 22 (indicating a clinically poor scar). There was little association between the participants' satisfaction with their sternal care and the objective scar score ($r=0.348$, $p=0.294$).

4. Discussion

We have developed a description of the subjective cosmetic impact of median sternotomy scars occurring in adult women. This work is the first to qualitatively examine womens' thoughts and feelings about their median sternotomy scar and to examine associations between womens' subjective satisfaction and clinicians' objective ratings of the sternal scar.

Our results are consistent with studies assessing the impact of sternotomy scars among participants with congenital heart disease, who had their surgery as children and/or young adults. These studies have revealed that a considerable proportion of people living with sternotomy and thoracotomy scars report the scar has had a negative affect on their self-esteem and self-confidence (20% and 18% respectively), [3] and they did not like or hated their scars (25% and 22% respectively) [4]. The advantage of this study over past work is that it reflects the majority of women who undergo sternotomy; the adults having coronary artery bypass and valvular surgery.

Altered physical appearance will affect how people, and women in particular, think about themselves and their bodies; or their body image [11]. The cancer [12,13] as well as burn [14] literature have confirmed this. For example, Fobair et al. [12] found half of 548 young women with breast cancer experienced body image problems 'some of the time' or 'much of the time' following their treatment. Approximately 45% of these women felt 'less feminine', 55% felt 'embarrassed about their body', and 46% were 'worried about sexual attractiveness' some or much of the time. Indeed, younger and partnered participants in our study revealed they felt less attractive to their partners. Moreover, they worried how others would view or judge the scar.

We found the participants' response to their sternal scars were shaped by social interactions and included the responses of strangers and others seeing the sternal scar. Other researchers have confirmed the importance of social interactions on scar-related behaviours. Wolszon [11] argued that physical appearance influences social interactions because it is a readily available source of information about a person. Whether or not the scar was exposed in cancer [13] or burn [14] victims had little or no effect on the patient's psychosocial outcomes. Yet, Kantoch et al. [3] identified approximately 50% of men and women reported that they hid their sternal and thorocotomy scars from others and median sternotomy scars were concealed more frequently than other scars (43% versus 36% respectively, $p=$ns). Many women in our study concealed their sternal scars from others; at least during the initial recovery period.

Some research suggests that women are more concerned with body image than men; largely because of the perceived societal pressure for women to be attractive [11]. Though not statistically significant (likely due to small sample sizes) investigators have found a greater proportion of women than men reported their scar(s): affected their choices of clothes and/or caused embarrassment (50% women, 40% men, $p=0.55$) [4]; negatively impacted their self-confidence (23% women, 13% men, $p=$ns) [3]; and negatively impacted their self-esteem (25% women, 15% men, $p=$ns) [3]. Crossland, et al. [4] reported significantly more women than men disliked or hated their sternotomy or thorocotomy scars (35% women, 14% men, $p=0.0012$). Though we did not set out to examine gender differences in perceptions regarding sternotomy scars, our study has revealed that indeed women have certain difficulties in dealing with cosmetic result of the sternal scar.

The definition of body image refers to "an individual's subjective evaluation of her size, weight, or any other aspect of physical appearance. A central aspect of this definition is that body image is a highly personalized experience. There is no necessary correlation between subjective experience and objective reality [11] (p. 544)." The lack of correlation between the subjective impact of sternotomy scar and objective assessments is consistent with similar research among burn patients. Lawrence, et al. [14] revealed objective measures of burn scars had little, if any, association with 'body esteem' for burn victims. They concluded "…burn characteristics are less important than social and emotional variables in determining body esteem in burn survivors (p. 31)." Though our sample size was small, it was apparent that there was little association between the subjective satisfaction and objective assessment of the sternal scars.

Currently most literature offered to cardiac surgery patients is generic and does not attend to the gender-specific issues that arise. Health care providers should play a part in helping patients accept their scars [14] by initiating conversations about body image [15]. New materials need to be developed that focus on women and enable family and friends to learn how to be sensitive to women's needs following sternotomy. When using the following suggestions for practice, health care providers would enhance the

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realization and acceptance process for women following sternotomy.

1. The potential impact of sternal scar formation should be discussed with women when the consult for cardiac surgery is undertaken — this discussion should be initiated by the health care provider.
2. Opportunities should be provided for women to speak with health care providers about their life after the immediate surgical recovery.
3. Clinicians' objective perceptions or ratings should not be used as an indicator of patients' perceptions regarding the sternal scar.

4.1. Strengths and limitations

There were several elements of this study that enhanced the trustworthiness (or rigor) [16,17] of the findings. The nature of qualitative research is such that its credibility (gaining the true essence and meaning of the phenomenon under study) rests heavily on the ability of the researcher to engage participants in a manner that they are able to authentically articulate their experience with the phenomenon of interest. The women who participated in this study were keenly interested in sharing their thoughts and feelings about the cosmetic result of the sternal scar. A major strength of this work was that study staff had developed very good relationships with WREST participants over time. Thus we believe that the participants were candid and authentic with their responses to the questions posed by our experienced interviewers. Credibility of the study process and findings was also enhanced by engaging in theoretical sampling, and ensuring data accuracy. Theoretical sampling rendered a group of participants who were theoretically representative of women who had a sternal scar and who could best describe the nature of the phenomenon under consideration. Data accuracy was assured by rigorously scrutinizing the transcriptions of interviews and field notes. Transferability (ability of others to see utility of the results in other contexts) was attained through development of very rich descriptions of the phenomenon under study. This was achieved through having careful sampling processes (e.g., ensuring the sample was representative and the participants were able and enabled to describe their thoughts and feelings), rigorous data analysis procedures (e.g., team approach, consensus building), and saturation of the data. Documentation (or creation of audit trails) of the details of these processes and including consensus building as part of the data analytic process enhanced dependability and confirmability of the findings and process.

There were some limitations to this work. Because the interviews were undertaken at only one point in time, we were unable to determine how the women's thoughts and feelings about their sternal scars changed over time. However the interviews and assessments were completed 1.5 to 3.75 years after surgery. This time would have allowed the scars to fully mature and most likely reflect the long-term impacts of the stenotomy scar. Second, like Kantoch et al., [3] we found it was occasionally difficult for participants to dissociate their experiences related to having had cardiac surgery (including sternal pain) from their thoughts and feelings about having a sternal scar. However, with careful use of communication techniques, interviewers were able to help the women focus on the phenomenon of interest.

5. Conclusion

We have qualitatively demonstrated that women can be affected by the sternal scar they wear following cardiac surgery, and this effect can extend months and years following surgery. The women in this study appreciated that having the scar was a cost of reaping the benefits of having cardiac surgery, but they were not well prepared to 'learn to live with' it. We conclude that the subjective perception of the sternal scar is of importance to women. Appropriate preparation as well as post-operative counseling and support regarding the sternal scar are needed, and this element of cardiac surgery recovery warrants further investigation.

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