

# Does Breast Augmentation Confer Risk of or Protection From Suicide?

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**Background:** Recent studies have suggested that suicide rates in breast augmentation patients are higher than those in the general population of women.

**Objective:** The author sought to establish the expected rate of suicide in breast augmentation patients and to compare the expected and actual rates.

**Methods:** The literature was reviewed to characterize the demographic, behavioral, and other qualities of the prototypical breast augmentation patient compared with those in the general population of women. By and large, presurgery characteristics of breast augmentation patients are similar to those of other women, but some relatively small demographic, behavioral, and other differences between these patients and other women were identified. These were used to develop a formal estimate of the expected rate of suicide among breast augmentation patients, which was then compared with established estimates of its actual rate.

**Results:** On the basis of demographic and other presurgery factors, the expected suicide rate among breast augmentation patients could be as high as 4 times the rate among the general population of women. Estimates of its actual rate are lower.

**Conclusions:** Suicide rates among breast augmentation patients appear to be lower than the expected rate when these patients' demographic and other pre-surgery characteristics are taken into account. The most plausible mechanism for this protective effect is increased satisfaction with body image. (Aesthetic Surg J 2003;23:370-377.)

Breast augmentation is one of the most commonly performed plastic surgery procedures. It is estimated that approximately 2 million women in the United States have breast implants.<sup>1</sup> Since 1992, an explosion of scientific data has shown breast implants to be safe and efficacious. Although breast augmentation patients are generally similar to other women, some investigators have reported that the suicide rate in breast augmentation patients is higher than that of the general population.<sup>2-4</sup>

Each year in the United States, approximately 5700 women commit suicide, for an overall annual suicide rate of approximately 4 women per 100,000.<sup>5</sup> If breast augmentation patients were fully representative of the general US population of women, their suicide rate would also be expected to be approximately 4 per 100,000 annually. However, breast augmentation patients differ slightly from the general population of women with respect to certain important variables. Crucially, small differences on important variables can combine to produce substantial differences in suicide rates, and virtually every issue on which breast augmentation patients differ from the general population is highly relevant to suicide.

The question, then, is not whether the suicide rate among breast augmentation patients differs from that of

the general population; as this study will show, we would expect it to differ, given the differences on key variables between breast augmentation patients and other women. The critical questions are, given the demographic and other characteristics of breast augmentation patients, what should their suicide rate be, what is it, and what are the implications of any difference between these rates?

## Methods

The literature was reviewed in an attempt to characterize the demographic, behavioral, and other qualities of the prototypical breast augmentation patient compared with those of the general population of US women. These were used to develop a formal estimate of the expected rate of suicide among breast augmentation patients, which was then compared with established estimates of its actual rate.

## Results

### Characteristics of the prototypical breast augmentation patient compared with women in general

**Race.** Breast augmentation patients in the United States are overwhelmingly white. Estimates of the percentage of

whites among women undergoing breast augmentation exceed 95%<sup>6</sup>; in one study, so few nonwhite patients were available that the researchers were forced to focus only on white women.<sup>7</sup> By contrast, the general US population is racially diverse and becoming more so. Recent estimates indicate that approximately 75% of the US population is white.<sup>8</sup>

**Age.** Breast augmentation patients generally range in age from 25 to 44 years.<sup>6,7</sup> In the study by Cook and colleagues,<sup>7</sup> 79% of breast augmentation patients were in this age range; the figure was 81% in a study by Brinton and colleagues.<sup>6</sup> A similar proportion was reported among Swedish women.<sup>3</sup> Naturally, the ages of women in the general population are far more variable.

**Marital Status.** Although it is somewhat less clear than race and age differences, there appears to be a tendency for a higher percentage of breast augmentation patients than other women to be divorced or separated. In the report by Cook et al,<sup>7</sup> 28.8% of breast augmentation patients were divorced, separated, or widowed (presumably very few were widowed, given the young average age of the women), relative to 18.1% in the comparison group. This difference produces a significant  $\chi^2$  statistic ( $\chi^2 = 5.87$ , degrees of freedom = 1,  $N = 3570$ ). We must emphasize that although the relative difference in divorce rates between breast augmentation patients and other women is important, the absolute rates of divorce among breast augmentation patients do not appear particularly high. This same point applies to the other variables reviewed below (eg, smoking, alcohol use, depression). Important relative differences exist between breast augmentation patients and other women with regard to these variables, but the absolute rates of these problems are low in breast augmentation patients, most of whom do not experience these problems.

**Smoking.** It appears that breast augmentation patients are somewhat more likely than others to use cigarettes. Studies from Denmark<sup>9</sup> and Sweden<sup>10</sup> have found rates of current smoking among breast augmentation patients close to 2 times the rate among the general population. Data from the United States are not as clear, however.<sup>7</sup>

**Alcohol Use.** Evidence suggests that compared with the general population, breast augmentation patients consume large amounts of alcohol at higher rates.<sup>7</sup> As noted in the next sections, this finding may in part stem from tendencies toward depression and impulsivity, both of which are associated with substance abuse and both of which may be increased in breast augmentation compared with other women. Again, this is a relative difference; most breast augmentation patients do not abuse alcohol.

**Symptoms of Mood, Eating, and Other Disorders.** Perhaps the clearest finding of all in the literature comparing breast augmentation patients with others is that breast augmentation patients are body-dissatisfied, at least with regard to their breasts.<sup>11</sup> Body dissatisfaction among women is a definite risk factor for mood<sup>12</sup> and eating disorders.<sup>13</sup> Although more research is needed, there is some evidence of preexisting depressive symptoms among breast augmentation patients<sup>14</sup> (similar data are not available with regard to eating disorders, but given the high rate of body dissatisfaction, it would be very surprising if breast augmentation patients were similar to others with regard to preexisting eating disorders). Breast augmentation patients may also have higher rates than others of body dysmorphic disorder, defined as an extreme and debilitating preoccupation with an imagined or slight defect in physical appearance. A prevalence rate of 7% has been found among breast augmentation patients, compared with 1% or less in the general population of women.<sup>11,15</sup> Although this relative difference is important, it is also important to note that 93% of breast augmentation patients do not experience body dysmorphic disorder.

**Personality.** Several lines of evidence converge to indicate that, on average, breast augmentation patients display somewhat more impulsive personality features than others. An early study of personality testing was consistent in this regard,<sup>16</sup> and rates of personality disorders may be higher in women seeking plastic surgery than in others.<sup>17</sup> Indirect indexes of impulsivity, such as more sexual partners, a greater number of terminated pregnancies, and earlier age at the time of first childbirth<sup>6,7</sup> are also more common in breast augmentation patients than in other women.

### Summary

The prototypical breast augmentation patient is white and aged 25 to 44 years. Although most breast augmentation patients are behaviorally and interpersonally stable, it appears that, before surgery, relative differences exist between these women and others with regard to divorce, heavy alcohol and cigarette use, and the symptoms of mood, eating, and appearance-related disorders. They may have more impulsive-personality features than other women. It is likely that other differences exist between breast augmentation patients and others, but the ones summarized above have received the most empirical attention.

### How do these characteristics of breast augmentation patients relate to suicide risk?

The fact that breast augmentation patients are likely to be white, aged 25 to 44 years, and slightly more prone

than other women to experience divorce and depression is highly relevant to suicide risk because each of these dimensions represents a suicide risk factor.

White women are more than twice as likely as other women to die as a result of suicide, and women in the 25- to 44-year age range are overrepresented among those who die by suicide.<sup>5</sup> The rate of suicide among divorced people is 2 to 3 times as high as the rate among others.<sup>18</sup> Symptoms of alcohol abuse, mood and eating disorders, and body dysmorphic disorder, as well as cigarette use and impulsive-personality features, are each strong predictors of serious suicidal behavior, including death by suicide.<sup>19-22</sup>

#### **Estimating the expected suicide rate in breast augmentation patients**

Given that there are small, relative differences between breast augmentation patients and other women with regard to demographic and other characteristics related to suicide risk, and given that in every case, the difference is such that breast augmentation patients are at higher risk, it is obvious that the expected suicide rate in breast augmentation patients should exceed the rate among the general population rates — but by how much?

It is possible to estimate the expected suicide rate among breast augmentation patients by establishing the relative increase in risk with regard to each factor discussed earlier and forming a multiplicative composite of these risk estimates to derive an approximation of overall suicide risk. With some caveats, to be noted later, this approach will yield a reasonable estimate of expected suicide risk among breast augmentation patients.

With regard to race, the US suicide rate for white women is 4.5 per 100,000, compared with the general-population rate among women of just over 4 per 100,000.<sup>2</sup> Breast augmentation patients, almost all of whom are white, would thus be expected to have a suicide rate 1.1 times that of the general population (4.5/4.1).

The rate of suicide among people aged 25 to 44 years is 1.28 times that in the general population.<sup>5</sup> Almost 80% of breast augmentation patients are in this age range (compared with 29% of the general population of women<sup>8</sup>); these women would therefore be expected to have a suicide rate 1.22 times that of the general population ( $80\% \times \text{risk of } 1.28 + \text{remaining } 20\% \times \text{risk of } 1 = 1.22$ ; risk of 1 is a valid estimate for women aged 15 to 24 years and 45 to 54 years, which are the age ranges for virtually all breast augmentation patients not in the 25- to 44-year-old range).

Suicide rates in divorced women are 2 to 3 times the

population rate.<sup>5</sup> As mentioned previously, Cook et al<sup>7</sup> reported a divorce rate of 28.8% in breast augmentation patients, compared with 18.1% in comparison subjects. By virtue of this difference, breast augmentation patients would be expected to have a suicide rate 1.36 times that of the general population ( $28.8\% \times \text{risk of } 2.5 + \text{remaining } 71.2\% \times \text{risk of } 0.9 = 1.36$ ; 0.9 is an estimate of relative risk for nondivorced people).

Women who smoke between 1 and 24 cigarettes a day are twice as likely to die as a result of suicide as those who do not smoke, and among those who smoke more than 25 cigarettes a day, the elevation in risk is four-fold.<sup>22</sup> It would be reasonable to estimate that smokers are 2.75 times more likely than nonsmokers to die as a result of suicide. It is noted that this rate of relative risk is in comparison with those who do not smoke at all (not the general population as a whole), which necessitates a change in the computational approach. In studies from Denmark and Sweden,<sup>9,10</sup> rates of smoking were clearly increased in breast augmentation patients compared with others. In the United States, Cook and colleagues<sup>7</sup> reported that 28.8% of breast augmentation patients were current smokers, relative to 24.8% of a comparison group. This difference in smoking rates translates into a small increase in risk for suicide of approximately 1.05 ( $28.8\% \times \text{risk of } 2.75 + \text{remaining } 71.2\% \times \text{risk of } 1 = 1.50$ ;  $24.8\% \times \text{risk of } 2.75 + \text{remaining } 75.2\% \times \text{risk of } 1 = 1.43$  —  $1.50/1.43 = 1.05$ ).

To this point, only race, age, divorced status, and smoking have been considered. Without even including the relatively stronger suicide-related variables of depression, alcohol abuse, and impulsivity, a multiplicative composite of the risk estimates considered thus far produces an approximation of overall expected suicide rate approximately 2 times the rate of the general population among breast augmentation patients.

It is difficult to estimate the relative increase in risk attributable to depression, alcohol abuse, and impulsivity (as well as other remaining variables, such as eating disorders), because prevalence rates among breast augmentation patients have not been clearly established. A minimum estimate for each can be inferred, however, from the calculations performed earlier with regard to divorce. Depression, alcohol abuse, and impulsivity are each a more powerful risk factor for suicide than is divorce; distributions of lifetime depression, alcohol abuse, and impulsivity in breast augmentation patients compared with those in other women likely approximate the values used earlier for divorce (28.8% vs 18.8%). Here again, parenthetically, it is emphasized that this rep-

resents a relative difference; although this difference has important implications for suicide risk, the percentages also clearly indicate that most breast augmentation patients do not experience these problems. Accordingly, the relative increase in risk for divorce (1.36) serves well as a minimum estimate of relative risk attributable to depression, alcohol abuse, and impulsivity.

Even with these minimum estimates for depression, alcohol abuse, and impulsivity, and not even including variables such as eating disorders and body dysmorphic disorder, the overall expected risk index is easily 4 times that of the general population, even when conservative risk estimates are used with regard to each variable (eg, 1.1 for race  $\times$  1.22 for age  $\times$  1.36 for divorce  $\times$  1.05 for smoking  $\times$  1.36 for depression  $\times$  1.36 for alcohol  $\times$  1.36 for impulsivity = 4.82).

A possible problem with this approach is the assumption that the variables are independent risk factors (ie, the contribution to suicide of depression is completely separate from the contribution to suicide of alcohol abuse). In some cases, this is a reasonable assumption, in that results were derived from studies that controlled for 1 variable in estimating the effects on suicide of another variable. Moreover, conservative risk estimates were used, which should offset this concern. Further still, important contributors to suicidality in breast augmentation patients (eg, eating disorders) were not included, and other potentially important variables (eg, low feelings of femininity) were not considered, which should add to the conservative nature of the risk estimate. Overall, then, the conservative approach should offset any limitations; on the basis of demographic and other presurgery factors, the suicide rate among breast augmentation patients could be expected to be approximately 4 times greater than that of the general population of women.

#### **Estimates of the actual suicide rate among breast augmentation patients**

The suicide rate among breast augmentation patients should be approximately 4 times the rate in the general population or higher; but what is the rate, actually? The only US study of this question reported a standardized mortality ratio (SMR) of 1.54 for suicide in breast augmentation patients compared with the general population.<sup>2</sup> Roughly speaking, an SMR of 1.56 indicates a risk that is 1.5 times the comparison group; an SMR of 1 indicates no risk relative to a comparison group. SMRs are estimates and thus have confidence intervals or error bands around them; when the confidence interval for the SMR includes 1.0, this can be interpreted as showing no

difference between a particular group and its comparison group. In fact, in the Brinton et al study,<sup>2</sup> the SMR for suicide was 1.54 with respect to breast augmentation patients versus the general population of women, but the confidence interval included 1, allowing the interpretation of no significant difference between breast augmentation patients and the general population of women with regard to suicide rates. Two other studies, in Sweden<sup>3</sup> and Finland,<sup>4</sup> have also reported SMRs for suicide in augmentation patients versus others as 2.9 and 3.2, respectively). These studies, taken together with the US study, yield a combined SMR of 2.13. Neither the combined rate nor the rate from the US study approaches the expected rate of 4 times that of the general population of women, raising the possibility that breast augmentation surgery is protective against suicide.

#### **Cautions and considerations**

It is important to emphasize that the calculations used in this paper are based on the best *available* estimates. While each is defensible, some are more clearly established than others. Many of the estimates were influenced by the most relevant US study;<sup>7</sup> while this study is persuasive, estimates would be better still if many such studies were available. While the overall approach to calculating the expected rate of suicide in breast augmentation patients is defensible, alternative approaches to aspects of the calculation are defensible as well. The expected SMRs calculated here are mostly unadjusted, whereas the SMRs from studies on actual suicide rates in breast augmentation patients are adjusted for some factors like age. However, it should be noted that some of the paper's estimates are from studies that statistically control for some of the relevant variables, which in part adjusts the estimates calculated here in ways similar to adjustments in studies on actual suicide rates in breast augmentation patients.

Clearly the most problematic aspect of the approach used here is the assumption that risk factors are independent. In most cases, they are not fully independent (although correlations are usually modest), which will lead to an over estimate of expected risk. However, the conservative approach taken throughout the paper, combined with the exclusion of some other important risk factors leads to an underestimate of expected risk. These factors thus appear to offset one another. Overall, the expected SMR for suicide of 4 or higher among breast augmentation patients should be interpreted with these considerations in mind, as should the conclusion that actual rates are lower than expected rates of suicide in breast augmentation patients. A conservative conclusion appears to be that

actual rates are no higher than—and most likely are lower than—expected rates.

### Discussion

The information detailed above suggests the possibility that breast augmentation is actually protective against suicide: The women who self-select for the procedure have approximately half the expected rate of suicide, given their demographic and other characteristics. This raises the question of the mechanisms underlying any protective effect.

Regarding protective mechanisms, although the ideal prospective study has not yet been conducted, nearly all breast augmentation patients are highly satisfied with the results.<sup>23</sup> Several investigators have studied patient satisfaction among breast augmentation patients, and a combined satisfaction score from these data indicates a patient-satisfaction rate of 90% to 95%.<sup>23-25</sup>

Therefore, given the clear findings that, before surgery, breast augmentation patients are body-dissatisfied (at least with regard to their breasts)<sup>11</sup>; and that body dissatisfaction is a risk factor for mood and eating disorders,<sup>12,13</sup> which, in turn, represent strong risk factors for suicide; and that breast augmentation appears to ameliorate body dissatisfaction for most patients, it stands to reason that the procedure may suppress suicidality by way of the protective effects of increased body image satisfaction against mental disorders that predispose individuals to suicide. This conclusion is consistent with work showing that psychological complications are extremely rare among women who have undergone breast augmentation, even among those patients with substantial psychological symptoms before surgery.<sup>26</sup>

### Conclusion

In general, breast augmentation patients are similar to other women with regard to behavioral and other variables, but some small differences exist. Breast augmentation patients have higher rates of suicide than the general population because small, relative differences in demographic and other preexisting characteristics guarantee that they will. More surprising, perhaps, is the fact that suicide rates among breast augmentation patients appear to be lower than the expected rates when their demographic and other preexisting characteristics are accounted for. The most plausible mechanism for this protective effect is improved body image satisfaction.

An illuminating study of this topic would prospectively follow 4 large groups of women, closely matched with regard to the dimensions considered in this paper (ie,

race, age, marital status, cigarette and alcohol use, present and past mood and eating disorders, body dysmorphic disorder, impulsive personality, and body dissatisfaction). One of the 4 groups would comprise women electing to undergo breast augmentation; the second group would include women electing to have some other form of elective plastic surgery; the third group would comprise women undergoing nonelective, relatively minor surgery; and the fourth group would be made up of women undergoing no surgery. Suicide attempts and completions would be tracked within each group, as would the development of depressive episodes. With the use of well-validated instruments (eg, SF-36, a short questionnaire on general health and functional status), quality of life and body image satisfaction of these subgroups would be followed as well. On the basis of the conclusions of this review, the prediction would be that the 2 plastic surgery groups would demonstrate lower rates of suicidality and depression than the other 2 groups and that this difference would be accounted for largely by increased body image satisfaction in the 2 plastic surgery groups ■.

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