Animation Deformity and Poor Mental Health Outcomes

Studies have shown an association between AD and poor mental health outcomes such as decreased quality of life and depression. Dimensions of quality of life strongly associated with AD include the perception of diminished emotional and psychological health,
decreased ability to engage in activities of daily living, and difficulties with personal relationships. The magnitude of this problem is illustrated by the finding that 80% of these patients report AD to be a bothersome complication that affects their everyday life. Of additional significance are recent findings showing an association between breast asymmetry, a common feature of AD, an elevated risk of depression, and decreased psychosocial functioning.

**Psychological Impact of Cosmetic Outcomes in Breast Reconstruction**

Breast cancer patients experiencing poor cosmetic results of breast reconstruction, such as AD, are known to be at an increased risk of poor psychosocial outcomes. For instance, a patient’s negative perception of the cosmetic outcome has been shown to be detrimental to psychological health. Higher levels of dissatisfaction are also associated with an increased risk of depression, anxiety, and disorders of body image. Body image dissatisfaction is of clinical significance because it has been found to be related to lower quality of life in cancer patients.

**Breast Cancer Patients Undergoing Reconstruction as a High Risk Population**

Breast cancer patients, especially those undergoing mastectomy and breast reconstruction, are known to be at an increased risk of psychiatric disorders. Compared to the general population, major depressive disorder is seen at significantly higher rates among those with breast cancer. In fact, the prevalence of depression in this group has been reported to be as high as 46%. Increased levels of hopelessness, a dimension of depression and risk factor for suicide, have also been observed among breast cancer patients receiving mastectomy. Recent research also indicates an increased risk of suicide among those who have surgeries involving breast implants. Other psychiatric comorbidities seen more frequently in breast cancer patients include posttraumatic stress disorder and generalized anxiety disorder, with respective prevalences of 10% and 16%.

Body image is another important factor to consider when discussing the psychological health of breast cancer survivors, with 50% - 75% reporting significant levels of body image dissatisfaction. Those undergoing mastectomy and reconstruction, in particular, are known to experience the highest risk of negative body image. Research also implicates a strong association between body image dissatisfaction, decreased mental health outcomes, and diminished self-esteem among breast cancer patients undergoing mastectomy and reconstruction. Conversely, positive body image is associated with increased levels of self-confidence in coping with cancer. Moreover, body dysmorphic disorder (BDD), the disabling preoccupation with a minor or imagined defect, is significantly higher among breast cancer patients pursuing breast reconstruction following mastectomy. This is significant because BDD has been shown to confer an elevated risk of depression and suicide.

It should be noted that, compared to mastectomy alone, breast reconstruction following mastectomy has been shown to yield psychosocial benefits. Although the underpinnings of this association have yet to be elucidated in the scientific literature, it may be related to body image and perception of cosmetic outcomes. As discussed above, these factors are known to impact psychosocial functioning in breast cancer survivors.

**Implications for Treatment of Animation Deformity**

Addressing the psychological impact of breast cancer, subsequent breast reconstruction, and surgical complications, such as AD, is of great importance. Several studies have shown psychological factors to be associated with overall survival in these patients. Therefore, it is essential to treat AD, should it appear as a complication in breast cancer patients receiving mastectomy with subpectoral implant placement.

Implant-based techniques are the most common methods...
for breast reconstruction in patients who have undergone mastectomy\textsuperscript{27}. Subpectoral, rather than pre-pectoral, placement of the implant is more commonly employed due to the belief that it yields a more natural appearing result\textsuperscript{28}. It also has a decreased risk of capsular contracture, which is scarring around the implant\textsuperscript{29}. Prevention of AD can be achieved through placement of the implant above the pectoralis muscle\textsuperscript{29}. However, this is not a viable option for all patients, especially those receiving radiation therapy prior to surgery\textsuperscript{29}. Options for treating AD include the following: repositioning the implant from subpectoral to prepectoral\textsuperscript{27}; a muscle splitting bimodal technique, in which the implant is partially covered by the pectoralis muscle\textsuperscript{30}; the injection of neuromodulators into the pectoralis muscle, which temporarily inhibits muscle contraction\textsuperscript{31}; and complete transection of the pectoralis muscle\textsuperscript{32}. Surgeries involving transection of the pectoralis muscle involve complete denervation of the tissue and subsequent muscular atrophy\textsuperscript{33}. An alternative method has been described in a recent case study that selectively denervated the pectoralis muscle through ablation of the medial and lateral pectoral nerves\textsuperscript{5}. Complete correction of AD was observed in this patient without long term muscle atrophy, indicating that this is another important consideration for this patient population\textsuperscript{5} (see figures 1, 2, 3, 4).

**Discussion**

While it is clear that treatment of AD is an important aspect of managing the psychosocial health of patients with breast cancer, it remains to be seen which surgical intervention yields the best mental health outcomes. Treatments that effectively correct the deformity and those that confer decreased risk of other complications will likely be the most successful. Because of the impact AD has on quality of life and psychosocial functioning, future research efforts should attempt to compare differences in mental health outcomes across the various AD treatment modalities.

Furthermore, because existent studies indicate there to be an association between AD and poor mental health outcomes, the nature of this relationship warrants future exploration. It may be necessary that studies be designed to evaluate more specifically how AD incurs an increased risk of depression and decreased quality of life. Further work may also explore potential associations between AD and other mental illnesses, such as anxiety disorders.

**Conclusion**

AD is a common and psychologically distressing complication of breast reconstruction among breast cancer survivors, who are at increased risk of poor mental health outcomes. Additionally, breast reconstruction and subsequent AD have been shown to be associated with a host of poor mental health outcomes. Examples include reduced quality of life, depression, body image dissatisfaction, and increased risk of suicide. Several options exist for the correction of AD, but research has yet to examine which method confers the best psychological outcome.

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**Conflicts of Interest**

The authors declare that they have no competing interests.

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