

## Original

# Examination of the Effectiveness of Acute Animal-assisted Therapy in Plastic Surgery:

## First Report on AAT in a Japanese Acute Care Hospital

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### Abstract

#### Introduction

Animal-assisted therapy (AAT) leverages companion animals, such as dogs and horses, to improve the mental and physical health of humans. Our hospital is one of Japan's few acute care facilities to implement AAT. Remarkably, it is the first in the nation to examine the efficacy of acute AAT (aAAT) within plastic surgery.

#### Subjects and Methods

The study involved inpatients at a plastic surgery clinic who had sustained physical injuries and consented to participate. Initially, we collaborated with a psychiatrist to devise a unique assessment sheet for patients to self-report their psychological states. Additionally, we developed a visual analog scale (VAS) to gauge the patients' anxiety levels. The psychological assessments utilized both the bespoke sheet and the VAS, with evaluations conducted before and after the aAAT intervention for comparison.

#### Results

The intervention included four patients who had undergone amputations due to complications such as diabetic foot gangrene, intractable ulcers, and chronic osteomyelitis. Post-intervention, there were notable enhancements in the stress VAS scores and stress-related metrics on the assessment sheet ( $P < 0.05$ ).

#### Discussion

Patients with physical injuries often face considerable stress from both their treatment and the unpredictable physical changes related to their injuries. Although no established psychological treatments exist for these patients, international studies suggest that aAAT could be beneficial. In the absence of existing models, we developed our own assessment sheet under the guidance of a psychiatrist, employing the educational "rubric" method for evaluations. This approach resulted in observed improvements in both the stress VAS and the stress-related items on the evaluation sheet. Despite the study's limitations, such as the evaluation sheet's validity and the small sample size, our findings indicate that aAAT may enhance the psychological well-being of patients with physical injuries.

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#### —Key words—

animal assisted therapy, acute care, examination of stress

## Introduction

Animal-assisted therapy (AAT) involves medical treatments that incorporate companion animals, such as dogs and horses, to enhance individuals' mental and physical health<sup>1)</sup>. The beneficial effects of human-animal interactions have been recognized since ancient times<sup>2)</sup>. As early as 450 BC, Hippocrates noted the therapeutic effects of horse riding<sup>2)</sup>. In the 1800s, Florence Nightingale observed that "the intervention of small animals assists the recovery"<sup>3)</sup>. Similarly, in the 1930s, Freud commented that "having his own dog beside a psychiatric patient during an examination reduces the patient's anxiety"<sup>3)</sup>. Building on these observations, in the 1960s, child psychiatrist Levinson, often called the "father of AAT," published numerous studies underscoring the therapeutic benefits of companion animals<sup>2)</sup>. Since then, AAT has become increasingly popular and recognized globally.

The benefits of AAT arise from various factors, which can be categorized into physical, mental, and social effects. These effects are interrelated and influenced by multiple variables including the subject, the animal, the caregiver, the environment, and the timing, making it challenging to develop a unified theory of AAT's mechanisms<sup>4)</sup>. Chandler et al. have identified several specific benefits of AAT<sup>5)</sup>: 1) stabilization of emotions and alleviation of anxiety, 2) stress reduction, 3) enhancement of motivation, and 4) improvement of communication. AAT is generally regarded as highly applicable in elderly care facilities, rehabilitation centers, palliative care wards, and chronic care hospitals, among others, with most AAT being utilized in these settings<sup>6-10)</sup>. However, reports of AAT in acute care hospitals are relatively rare, even internationally<sup>11)</sup>.

In Japan, AAT is less widespread than in other countries. As of August 2024, only a handful of facilities offer AAT in acute care settings. Our hospital is among these pioneers, implementing what we term acute animal-assisted therapy (aAAT) using specially trained 'medical dogs.' We believe that the benefits of AAT can extend to hospitalized patients in acute care environments. We have introduced aAAT in plastic surgery and observed its psychological impacts. To our knowledge, this study is the first to explore the effects of AAT on acute care patients within the surgical field, specifically plastic surgery. We hypothesized that aAAT would benefit these patients and our research aims to confirm its effectiveness.

## Subjects and Methods

This study was approved by the Kitasato University Medical Center Ethics Committee (approval number 2024011). Participants were patients admitted to the Department of Plastic Surgery who had experienced amputation due to illness or treatment, underwent aAAT, and consented to participate in the study.

### Implementation of aAAT

aAAT was initiated only after confirming that patients had no allergies to dogs, their condition had stabilized post-surgery, and they had given their consent. aAAT was tailored for each patient based on goals and care plans developed by medical professionals, with outcomes documented in the electronic medical record. Sessions required prior reservation and were conducted in a dedicated space for 10 to 15 minutes weekly.

### Creating evaluation sheets and forms

Initially, we created a unique evaluation sheet to assess what we defined as "psychological constructs"<sup>12)</sup>, which included four items: 1) anxiety related to illness, 2) stress associated with hospitalization, 3) adaptation to physical condition, and 4) communication with others. These constructs were based on the known effects of AAT<sup>13)</sup> and tailored to our specific patient population. The evaluation employed a standard five-point rating scale<sup>12)</sup>. The evaluation method involved self-assessment by the patients. During the preparation phase of this study, we anticipated that the target patients might struggle with a questionnaire format, which necessitates understanding instructional text and answering numerous questions. To address this, we designed the evaluation sheet used in this study by referencing evaluation sheets (rubrics) that have recently gained attention in the field of education<sup>14)15)</sup> (Table 1). In this evaluation sheet, each square contains a sentence that clearly describes the state of the four psychological constructs on a five-point scale. Patients were instructed to select the square that best represented their condition. This format was developed in consultation with psychiatrists to ensure it did not overly burden the patients.

**Table 1** The Evaluation Sheet that we used for this study. The bar below the sheet shows VAS.

Evaluation sheet					
	1	2	3	4	5
Anxiety about illness	I'm so anxious, it is difficult to think about anything else.	I'm so anxious, I don't know what to do.	I'm anxious, but I can think about what I need to do.	I'm a little anxious, but I can deal with it.	I'm barely anxious.
Hospitalization and treatment-related stress	I'm extremely stressed. I can't deal with the current situation.	I'm so stressed, I don't know what to do.	I'm stressed, but I know what I need to do.	I'm coping with my stress. I'm stressed, but it isn't horrible.	I don't really feel stressed. I am not stressed.
Current state of adaptation	I can't comprehend the state my body is in right now. I can't bear it.	I comprehend the state my body is in, but I can't cope with it.	I comprehend the state my body is in, and I'm trying to cope with it.	I comprehend the state my body is in, and I'm coping with it.	I'm coping with the state my body is in, and I don't view it as a burden.
Communication with hospital staff and others around me	I avoid communication.	I want to communicate, but I haven't tried yet.	I want to communicate, and I'm trying.	I'm communicating.	I'm communicating, and I've built good relationships.

**Table 2** Table summarizing patient data for the 4 cases in our study.

	Gender	Age	Disease	Surgical interventions
Case 1	F	64	diabetic foot gangrene	toe amputation
Case 2	M	60	diabetic foot gangrene	below-knee amputation
Case 3	F	59	intractable ulcers	below-knee amputation
Case 4	F	85	chronic osteomyelitis	toe amputation

Additionally, a visual analog scale (VAS) was used to measure patient anxiety. We modified the VAS (originally on a scale of 0 to 100) to 0 to 20 cm to accommodate our patients effectively, positioning the stressful (undesirable) state on the left.

### Evaluation

Patients assessed their psychological state using a combined form that included the evaluation sheet and the VAS (Table 1). Evaluations were conducted both before and after the implementation of aAAT. The pre-aAAT evaluation occurred once the postoperative condition had stabilized, approximately 10 days post-surgery, following suture removal. The evaluation sheet was organized into five stages, with scores ranging from 1 point, representing the least desirable state, to 5 points, indicating the most desirable state. The VAS measurements were adjusted to a standardized scale, halving its total length to 10 cm.

### Statistical analyses

Statistical analyses were performed using JMP Pro version 17 software for Windows (SAS Institute Inc., Cary, NC, USA). Descriptive statistics summarized the data collected. The total scores from the VAS and the rubric questionnaire, as well as individual item scores before and after aAAT, were compared using a paired two-tailed t-test. A significance level of  $P < 0.05$  was established.

### Results

A total of four cases were examined, ranging in age from 59 to 85 years, consisting of three females and one male. The conditions treated included diabetic foot gangrene, intractable ulcers, and chronic osteomyelitis, all necessitating some form of amputation. Surgical interventions involved below-knee amputation in two cases and toe amputation in the other two. Improvements were noted in both the self-assessment scores and the VAS for stress following the intervention. Table 2 lists the cases, and Fig. 1 displays the self-assessment scores for each case before and after implementing aAAT.

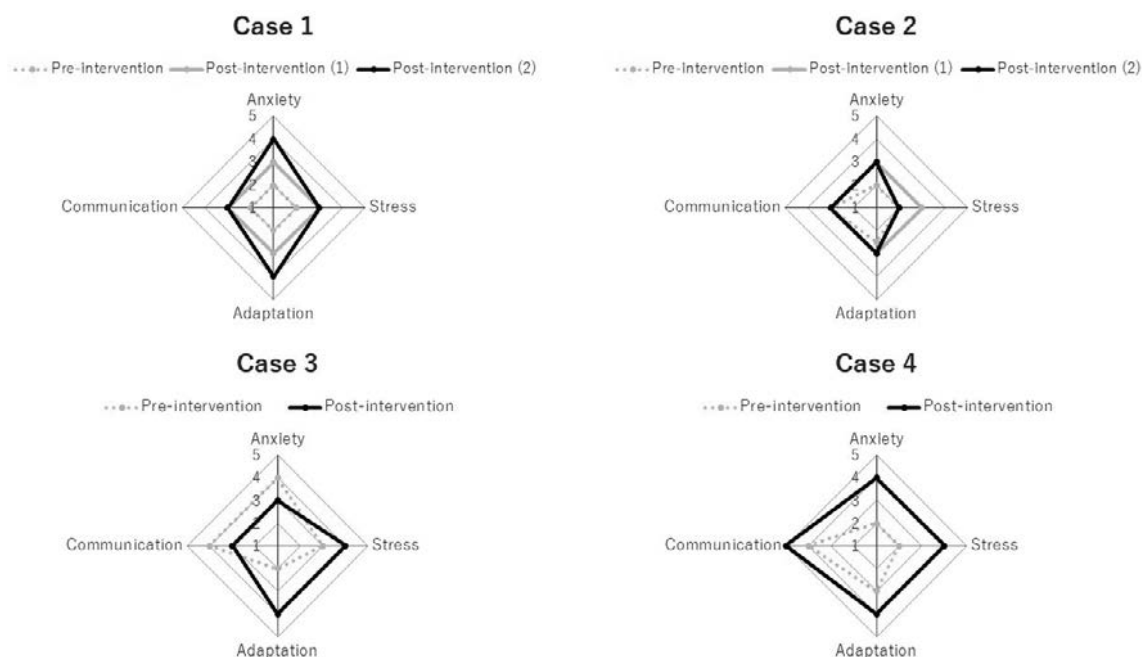


Fig. 1 The result of evaluation sheet for the 4 cases

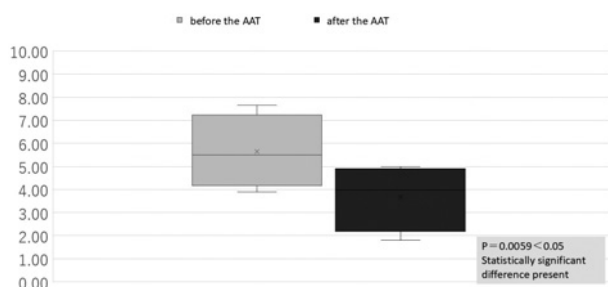


Fig. 2 Comparison of VAS before and after the introduction of AAT

The VAS, adjusted to a 10 cm scale, showed a significant reduction in stress levels ( $P = 0.0059$ ).

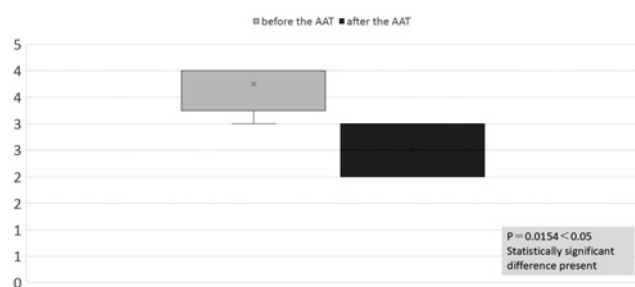


Fig. 3 Comparison of stress score before and after the introduction of AAT

The self-evaluation sheet indicated a significant enhancement in the stress-related scores ( $P = 0.0154$ ) following the introduction of aAAT.

The VAS, adjusted to a 10 cm scale, showed a significant reduction in stress levels ( $P = 0.0059$ ) when comparing pre- and post-aAAT scores (Fig. 2). The self-evaluation sheet (maximum of 20 points: 5 points per item across four items) also indicated a significant enhancement in the stress-related scores ( $P = 0.0154$ ) following the introduction of aAAT (Fig. 3). However, no statistically significant changes were found in the items related to anxiety, adaptation, and communication before and after the aAAT intervention.

## Discussion

### What is AAT?

Animal-assisted therapy (AAT) is a therapeutic intervention that employs companion animals to improve an individual's physical, cognitive, behavioral, or psychosocial functioning. Administered systematically by medical professionals, AAT includes detailed planning and documentation of progress. It requires oversight by professionals with appropriate qualifications or credentials. In contrast, activities lacking specific therapeutic objectives, medical oversight, planning, or documentation are referred to as animal-assisted activities. Common companion animals used in AAT include dogs and horses. Professionals conducting AAT must be knowledge-

able about the animals' behavior, needs, health, and signs of stress. In Japan, dogs are commonly used in AAT. From a public health perspective, dogs are well-suited for preventive management, making it easy to administer vaccinations, manage health, and control behavior, thus reducing the risk of introducing infections into hospital settings. Additionally, dogs are regarded as highly friendly companion animals within Japanese society.

**aAAT at our facility (<https://www.kitasato-u.ac.jp/kmc-hp/hospital/initiative/animal.html>)**

Our hospital began preparations to integrate medical dogs in 2012, establishing a preparatory committee in 2013, with activities commencing in February 2014<sup>19</sup>. In 2015, Kitasato University and the Japan Guide Dog Association formed a collaborative agreement, enhancing the provision of well-trained dogs along with comprehensive behavior management, dog welfare, and handler (dog manager) training. This partnership laid the groundwork for sustained AAT practices. Presently, no medical fee is associated with AAT, with all related expenses being absorbed by the hospital. Given the challenging economic environment surrounding medical care, in 2019, we initiated a crowdfunding campaign to financially support aAAT, which received significant community recognition and support. As of 2024, the fourth generation of medical dogs, including breeds such as Labrador Retrievers and Golden Retrievers, loaned from the Japan Guide Dog Association, is actively engaged at our facility.

AAT is implemented for general hospitalized patients at our facility. aAAT was initially introduced by pediatricians, beginning with a 9-year-old girl diagnosed with Ullrich congenital muscular dystrophy, who was hospitalized for pneumonia. Since then, the benefits of aAAT have been recognized for adult patients as well, including those with conditions like cerebral infarction. To date, over 1,000 aAAT sessions have been conducted. Our hospital has formed a dedicated medical dog team that includes doctors, nurses, administrative staff, and handlers (Fig. 4). The handlers, who are often physical therapists or nurses, have a deep understanding of the patients' conditions and work closely with the rest of the medical team. A psychiatrist on the team sets the goals for each session and evaluates the patient's response afterward.

Our medical dogs are vaccinated against infectious diseases, receive regular veterinary check-ups, and are monitored continuously for health and hygiene. When working, they wear manner coats to minimize shedding, especially in sensitive areas such as during patient showers. Each dog is assigned to 3–4 patients per day, spending 10–15 minutes with each patient (Fig. 5). Sessions are spaced with breaks ranging from 10–30 minutes and are conducted weekly. If a medical dog's health is compromised, aAAT sessions may be temporarily paused.

A unique consideration for aAAT in our plastic surgery department involves the management of odors during medical examinations. Due to dogs' sensitive sense of smell, aAAT is not initiated immediately upon patient admission. Instead, it begins only after any odors from wounds and ointments have been effectively managed.

**Evaluating the effects of aAAT**

While the effectiveness of aAAT is recognized in clinical practice, presenting it as scientifically valid—objective and reproducible—remains a challenge<sup>20</sup>. Existing reports encompass evaluations of physical function, analysis of behavioral data, physiological indicators (such as salivary amylase levels and brain activation measurements using near-infrared technology), and questionnaire surveys utilizing psychological scales<sup>4(21)–23</sup>. However, these methods are not yet firmly established. We initially tried to use the Profile of Mood States (POMS), a well-known mood scale, but the target patient could not complete it accurately<sup>12</sup>. Consequently, we developed our own evaluation method. Direct measurement of psychological phenomena is complex; we defined what we aimed to assess as “psychological constructs,” inspired by the work of Yokouchi et al.<sup>12</sup>. We then created an evaluation sheet using the rubric method, commonly used in education. Internationally, rubrics have proven useful in evaluating horse-assisted AAT for children with autism spectrum disorder (ASD), demonstrating their potential for objective assessment<sup>14</sup>. However, the measurement of effectiveness through evaluation sheets has not been well established. Additionally, using multiple evaluation methods can enhance objectivity compared to a single method<sup>20</sup>. For these reasons, we also incorporated the VAS. Considering our subjects included older individuals and patients with diabetic retinopathy, we took steps to enhance the visibility and intuitive use of the VAS<sup>12</sup>. The evaluation method employed in this study was designed to minimize pa-



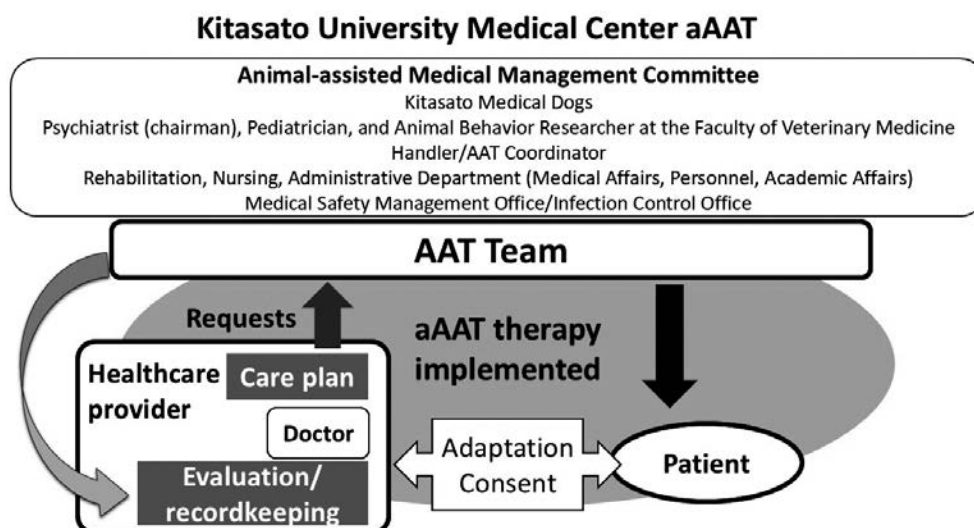


Fig. 4 Organizational chart of the AAT at Kitasato University Medical Center



Fig. 5 The AAT at Kitasato University Medical Center

tient burden and could be completed quickly, without adversely affecting routine medical care.

Our evaluation method is still in the prototype stage and faces challenges related to reliability and validity. The difficulty in scientifically evaluating aAAT has made us cautious about promoting it within academic circles. Uchiyama et al. noted that the lack of evidence supporting AAT's effectiveness is a significant barrier to its advancement in Japan and acceptance in the medical community<sup>20</sup>. This report also involved a limited number of cases, which leaves room for further discussion about the evaluation method used. Nevertheless, we argue that the accumulation of clinical data is essential for advancing AAT; thus, we have developed and reported on an evaluation method.

#### Effects of aAAT in plastic surgery

To date, we have observed that patients with physical injuries undergoing treatment in plastic surgery experience significant stress related to hospitalization and treatment, often struggling with unpredictable bodily changes. The absence of established psychological interventions for these patients has led us to explore alternative approaches to support them. In this context, we have assessed the potential psychological benefits of aAAT on these patients. The first case in our department involved a 9-year-old boy who was urgently admitted with burns. Following aAAT, he showed notable improvements in his attitude toward treatment. Since that initial case, we have also observed the benefits of aAAT in adult patients, including those who have undergone transfemoral amputations. However, the effects of aAAT on acute plastic surgery patients have not been previously reported in Japan. Therefore, we aimed to investigate these effects on patients hospitalized for plastic surgery with amputation. Our findings indicate improvements in both the evaluation sheet scores and the VAS for stress across all cases. These results suggest that aAAT may significantly enhance the psy-

chological state of patients, particularly in terms of stress reduction.

By uncovering new insights that AAT is beneficial for acute patients, medical professionals are provided with an additional option for conventional treatment. This report seeks to promote the use of aAAT, and further research is anticipated to develop more effective treatment modalities.

### Limitations

This report is based on a small number of cases, and the evaluation methods employed are not yet established.

### Conclusion

We implemented aAAT on hospitalized patients in the plastic surgery department and assessed the outcomes using a customized evaluation sheet. The findings suggest that aAAT may be beneficial for patients with physical injuries.

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## 形成外科における急性期動物介在療法の有効性の検討

### —日本の急性期病院での AAT に関する初報告—

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#### —キーワード—

動物介在療法, 急性期, ストレス

【緒言】動物介在療法 (animal assisted therapy : AAT) とは, 伴侶動物の力を借りて人の精神・肉体状態の向上を目的に実施される医療行為を指す。本院は急性期病院で AAT を施行する日本では稀な施設である。我々は形成外科における急性期 AAT (acute AAT, aAAT) の効果について検討したため報告する。

【対象と方法】対象は形成外科で身体損傷を伴い, 本研究に同意を得られた入院患者とした。まず患者自らが心理状態を評価できる独自の評価表を作成した。この評価表と不安に対する VAS が併記された用紙を用い, 患者自らが記入し, 評価を行った。評価は aAAT 導入の前後で行い, 両者を比較検討した。

【結果】全症例は 4 例, 年齢は 59~85 歳, 性別は男性 1 例, 女性 3 例であった。糖尿病性足壊疽が 2 例, 足背部難治性潰瘍が 1 例, 慢性骨髓炎が 1 例であった。2 例に下腿切断術, 2 例に足趾切断術を施行した。全ての症例で介入後の自己評価表のストレスのスコアと VAS が有意差をもって改善していた。

【考察】身体損傷を伴う患者は治療に伴うストレスに加え, 予測し得なかった身体変化への対応にも困難を伴う。これらの患者への心理的アプローチに確立した方法はないが, 海外の報告をもとに我々は aAAT が効果を示すと仮説を立てた。そして前例がないため, 教育領域で用いられる“ルーブリック”の手法に準じ, 精神科医の監修のもと, 独自の評価表を作成し評価した。その結果, 全例で評価表のスコアとストレスに対する VAS の改善を認めた。評価法が確立しておらず, 症例数は限られたが, aAAT は患者の心理状態を改善する可能性が示唆された。

【COI 開示】本論文に関して開示すべき COI 状態はない

(日職災医誌, 73 : 77—84, 2025)