



# Aesthetic abdominoplasty has a positive impact on quality of life prospectively

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## KEYWORDS

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**Summary Background:** In our previous retrospective study, we detected an increased quality of life after aesthetic abdominoplasty. In this survey, we analyzed quality of life, self-esteem, emotional stability, and mental health before and after aesthetic abdominoplasty prospectively.

**Methods:** Twenty-two female patients were surveyed before and six months after their surgeries. The testing instrument consisted of a self-developed indication-specific questionnaire and four standardized tests (Questions on Life Satisfaction plus a specified part body image, Rosenberg Self-Esteem Scale, Freiburg Personality Inventory, and Patient Health Questionnaire-4).

**Results:** Significantly increased values were found concerning feeling comfortable in swimwear in front of the mirror or the sexual partner and at social or professional activities (each  $p=0.000$ ). Women had less problems doing sports ( $p=0.029$ ) and felt more feminine ( $p=0.012$ ). Sum scores of general life satisfaction ( $p=0.016$ ) and scores of the items leisure

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activity ( $p=0.003$ ), relaxing abilities ( $p=0.002$ ), and sexuality ( $p=0.046$ ) showed significant improvements. The body image improved in general ( $p=0.010$ ) and in particular in the items abdomen, hips, and waist (each  $p=0.000$ ). Emotional stability increased significantly ( $p=0.029$ ). We detected a mild mental depression in 27% and a moderate depression in 32% of our patients before surgery. Depressive disorders were significantly reduced ( $p=0.004$ ) down to mild depression in 18% and moderate depression in 9% of the patients.

**Conclusion:** Positive results for quality of life shown in the retrospective study were confirmed. Abdominoplasty improves general life satisfaction and satisfaction with health and outer appearance and increases emotional stability. Depressive patients showed a significant improvement after aesthetic abdominoplasty.

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## Background

Quality of life is to be seen as a complex structure built of physical, psychological, and social components.<sup>1</sup> Although there are many objective, hard facts to measure quality of life - for example, health, education, safety, income, or environment - quality of life is a highly individual construct.<sup>2</sup> To every single person, various aspects of the multidimensional construct are of differing importance. There is a strong tendency to measure the indication for medical treatment no longer in years of survival but in quality-adjusted life years.<sup>3</sup> Improvement in quality of life is the most important if not the exact indication for cosmetic surgery.<sup>4</sup> Individuals undergoing aesthetic surgical treatment are hoping for improvement in living in various aspects.<sup>5,6</sup>

There is strong evidence that beautiful people have essential advantages in life. People with an attractive outer appearance can find sexual partners more easily, get better paid jobs, and are of better health.<sup>7</sup> Thus, a slim waistline represents health and discipline.

In general, patients who wish to undergo aesthetic abdominoplasty have more mental problems than other aesthetic surgery patients. They have high expectations of leading a better life after treatment.<sup>8</sup>

Whereas there are many studies concerning postbariatric surgery, there are barely any data about quality of life after cosmetic surgery.<sup>9</sup>

In former studies, our research group conducted studies on quality of life after aesthetic, plastic, and reconstructive surgery and showed that aesthetic surgery improves quality of life in many aspects.<sup>10</sup> In particular, the previous retrospective study proved that aesthetic abdominoplasty increases quality of life. Patients were more content with family life, living conditions, mobility, and independence from assistance. Self-esteem and emotional stability were increased after surgery.<sup>11</sup>

We designed this study to examine quality of life after aesthetic abdominoplasty prospectively and to confirm data of the previous study. [Figs. 1-3.](#)

## Patients and methods

To exclude biases caused by different surgeons, we included only patients who underwent surgery by the same surgi-

cal team. The second inclusion criterion was aesthetic abdominoplasty (Psillakis type IV),<sup>12</sup> and all included patients gave their informed consent to participate in this study. Exclusion criteria were medical indications for abdominoplasty, such as bariatric surgery or chronic-recurring inflammatory processes of skin folds.

Patients were questioned and photographed before and six months after their abdominoplasty. Both questionnaires - the preoperative and the postoperative one - consisted of a self-developed indication-specific questionnaire and four standardized tests: Questions on Life Satisfaction (FLZ<sup>M</sup> = Fragebogen zur Lebenszufriedenheit) plus a specified part for the body image,<sup>13</sup> the Rosenberg Self-Esteem Scale (RSES),<sup>14</sup> the Freiburg Personality Inventory (FPI),<sup>15</sup> and the Patient Health Questionnaire-4 (PHQ-4).<sup>16</sup> The FLZ<sup>M</sup>, the RSES, the FPI, and the PHQ-4 are standardized and validated tests with available norm data for the German population.

The self-developed indication-specific questionnaire contains demographic and socioeconomic characteristics. We extended this questionnaire with more specific aspects concerning outer appearance and added questions about patient's feeling in front of the mirror or the sexual partner or about problems with clothing. In addition, we required information about the patient's personal intentions, expectations, and concerns about the planned surgery. The postoperative questionnaire contains aspects such as patient's satisfaction with aesthetic results, social contacts after surgery, and postoperative complications including pain, hematoma, or the requirement of revision operations. The majority of the postoperative questions had already been used in the previous retrospective study.<sup>11</sup>

The Questions on Life Satisfaction (FLZ<sup>M</sup>) measures the patient's satisfaction with life in three parts: general satisfaction, satisfaction with health, and satisfaction with outer appearance (body image). For every element, patients evaluate single items for its individual importance and the degree of satisfaction with this item. Among these data, the weighted satisfaction can be calculated and compared to existing national norm data.<sup>13</sup> For the third part - outer appearance - norm data were not available yet; therefore, we compared the results with those given in previous studies by our research group.<sup>10</sup> A value of -12 indicates the lowest weighted satisfaction, whereas a value of +20 indicates the highest weighted satisfaction with the single item.

Personal Health Questionnaire-4 <sup>16</sup>				
Over the last 2 weeks, how often have you been bothered by the following problems?				
	Not at all	Several days	More the half the days	Nearly every day
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop control worrying	0	1	2	3
3. Little interest or pleasure in doing things	0	1	2	3
4. Feeling down, depressed, or hopeless	0	1	2	3

**Fig. 1** Patient Health Questionnaire-4.

Sum score: 0-2 = "no mental depression," 3-5 = "mild mental depression," 6-8 = "moderate mental depression," 9-12 = "severe mental depression".

The Rosenberg Self-Esteem Scale is a common internationally used questionnaire to measure the patient's self-esteem. Participants' responses can range from "strongly agree" to "strongly disagree" for ten statements in four gradations. Sum scores more than 30 indicate a high self-esteem. National norm data enable comparison with those obtained with our patients.<sup>14</sup>

The Freiburg Personality Inventory is a handy instrument for evaluating the patient's emotional stability. We used the module "emotionality" only and not the entire inventory containing 138 questions. The used module consists of 12 items on mood, nervousness, and behavior in emotional or stressful situations. Data have to be converted into "stanine" split up in gender and age before being compared to national norm data. Results can be interpreted as extremely well balanced, very well balanced, well balanced, or unbalanced emotional stability.<sup>17</sup>

To assess mental health, we used the Patient Health Questionnaire-4. Its items are drawn from the first two items of the Generalized Anxiety Disorder-7 Scale and the Patient Health Questionnaire-8. This test allows a very accurate measurement of depression and is also recommended in the latest guidelines of depression of the German society for psychiatry.<sup>18</sup> Participants are asked about their feelings during the last two weeks, for example, interests or joy in their activities, sorrows, or nervousness. Sum scores give hints for the presence of none, mild, moderate, or severe mental depression. As norm data are available, we could compare our patients before and after abdominoplasty to the general German population.<sup>16</sup>

Statistic evaluation was done with SPSS 25.0 (SPSS, Inc., Chicago, IL). We used the t-test for paired and unpaired samples. The level of significance was set at  $p \leq 0.05$ .

The study was approved by the ethics committee of our university (approval number 252/14 TUM). All authors adhered to the Declaration of Helsinki. None of the authors had a financial interest in any of the products, devices, or drugs mentioned in this manuscript. [Tables 1-3.](#)

## Results

From April 2015 to December 2017, 23 patients met the inclusion criteria for this survey. Finally, 22 patients took part in the study; one patient did not answer the questionnaire, although having confirmed participation before.

There were only female patients aged between 21 and 67 years (mean age  $41.6 \pm 12.9$  years). The mean body mass index was  $25.6 \text{ kg/m}^2$  (range 20.1 to  $32.7 \text{ kg/m}^2$ ). Two patients suffered from class I obesity, 11 were overweight, and all other patients were normal weight. Fourteen patients had at least one pregnancy in their medical history (64% patients) and had one to four children (mean 2.3). Most of them (68%) were married, three patients were single, two divorced, and two women were widowed. Only three patients were smokers. Four patients suffered from chronic diseases (hypothyroidism, chronic gastritis, hypertension, and celiac disease). Four patients had undergone psychotherapeutic treatment because of mental stress due to negative body image but without sufficient effect.

## Self-developed indication-specific questionnaire

The self-developed indication-specific questionnaire showed the following results: five women had already undergone other aesthetic surgeries such as facelift or breast lifting. Women had been considering undergoing surgery between a half year and 20 years (mean  $4.9 \pm 5.6$ ).

The main reasons for wishing abdominoplasty were excess and hanging skin after pregnancy, stretch marks, and rectus diastasis. Before surgery, eight women had lost weight between 10 kg and 70 kg (mean  $37 \text{ kg} \pm 20$ ). When assessed for psychosocial reasons, women hoped to be more satisfied with their bodies, to accept themselves when looking in the mirror, to feel more attractive, and to be free with the choice of clothing. Moreover, they expected advantages in their general well-being, sexual lives, and so-

**Table 1** Results of the self-developed indication-specific questionnaire.

	Study group T0		Study group T1		N	p (t-test, T0 vs. T1)
	Mean	SD	Mean	SD		
<b>Do you have problems because of your abdominal wall ...</b>						
... with clothing?	3.5	1.3	1.7	1.0	22	<b>*0.000</b>
... doing sports?	1.9	1.1	1.5	0.7	22	<b>*0.029</b>
... going into the swimming bath?	3.2	1.5	1.6	1.0	22	<b>*0.000</b>
<b>Do you feel disturbed by your abdominal wall ...</b>						
... in front of the mirror (clothed)?	2.8	1.4	0.9	1.4	22	<b>*0.000</b>
... in front of the mirror (unclothed)?	3.7	0.8	1.5	1.6	22	<b>*0.000</b>
... in front of your partner (clothed)?	1.9	1.6	0.7	1.0	22	<b>*0.011</b>
... in front of your partner (unclothed)?	3.1	1.1	1.2	1.4	22	<b>*0.000</b>
... at social or professional activities ?	1.7	1.2	0.5	0.9	22	<b>*0.000</b>
<b>Do you feel less feminine because of your body?</b>	2.0	1.1	1.3	1.2	22	<b>*0.012</b>

T0 = before surgery; T1 = six months after surgery

SD = standard deviation; N = number of patients

Rated from 1 = "does not apply at all" to 5 = "meets fully"

\* Statistically significant difference with  $p < 0.05$  (paired t-test)

**Table 2** Weighted results for the Questions on Life Satisfaction; module: body image.

	Study group T0		Study group T1		N	p (t-test, T0 vs. T1)
	Mean	SD	Mean	SD		
Hair	7.8	7.4	8.6	7.6	22	0.546
Ears	8.3	8.5	8.4	8.1	22	0.909
Eyes	11.9	6.5	12.5	7.0	22	0.666
Nose	9.3	7.2	9.2	7.3	22	0.954
Mouth	12.3	7.9	11.0	6.6	22	0.339
Teeth	10.6	8.3	12.7	7.7	22	0.132
Facial hair	8.1	7.9	9.3	8.8	22	0.544
Chin/Neck	6.6	6.4	8.1	7.3	22	0.288
Shoulders	6.5	7.3	6.9	8.2	22	0.826
Breast/Bosom	7.0	8.2	9.5	8.9	22	0.250
Abdomen	-8.4	4.4	10.8	10.1	22	<b>*0.000</b>
Waist	-5.5	8.0	10.9	9.7	22	<b>*0.000</b>
Hips	-3.0	9.1	8.3	9.1	22	<b>*0.000</b>
Penis/Vagina	5.4	8.0	8.5	6.6	22	0.100
Bottom	5.5	8.6	5.6	9.0	22	0.964
Thighs	2.6	9.7	4.2	9.0	22	0.288
Feet	6.3	7.1	7.9	5.1	22	0.271
Hands	10.3	7.0	9.4	7.1	22	0.472
Skin	10.4	6.9	9.9	7.1	22	0.760
Body hair	9.0	7.5	10.7	7.6	22	0.302
Size	6.9	6.3	7.5	7.6	22	0.584
Weight	1.2	10.0	4.4	7.8	22	0.066
<b>Sum score</b>	<b>129.1</b>	<b>91.7</b>	<b>193.4</b>	<b>97.0</b>	<b>22</b>	<b>*0.001</b>

T0 = before surgery; T1 = six months after surgery

Rated from -12 = "lowest satisfaction" to +20 = "highest satisfaction"

\* Statistically significant difference with  $p < 0.05$  (paired t-test)

cial surroundings. Patients were concerned about anesthesia and operative complications the most.

They were inpatients for one to three days. Ten patients suffered from minor complications such as pain, hematoma, and swelling. Seroma punctures were necessary in four pa-

tients, and wound dehiscences required secondary intervention in three cases. In one patient, a "dog ear" on the left required revision surgery. Revision surgery led to recovery in all cases. Four patients had no complications at all.

Patients perceived surgery to have been a moderately severe burden (on a visual analog scale (VAS) ranging from 0 = "no burden" to 10 = "highest burden," the average answer was  $6.6 \pm 3.4$ ). However, satisfaction with the aesthetic result (mean VAS  $7.4 \pm 2.7$ ), the amount of tissue reduction (mean VAS  $8.7 \pm 2.5$ ), and their body shaping concerning the operation field (mean VAS  $6.9 \pm 3.0$ ) was very high.

More than two thirds of women would undergo this treatment again, and 86% would recommend abdominoplasty to their friends. Women applied that all the strains were worth it, with an average of 4.1 (rating from 1 = "no applies at all" to 5 = "fully applies").

Comparing pre- to postoperative answers, significant improvements were found in almost all measured items. Patients had no more problems with clothing ( $p=0.000$ ) or visiting the swimming bath ( $p=0.000$ ). They did no longer feel disturbed by their abdominal wall in front of the mirror (clothed  $p=0.000$ , unclothed  $p=0.001$ ) or sexual partner (clothed  $p=0.011$ , unclothed  $p=0.000$ ). Women felt better being photographed ( $p=0.001$ ) and felt more feminine ( $p=0.012$ ). Difficulties at sports ( $p=0.029$ ) or social and professional activities ( $p=0.000$ ) were also reduced.

### Questions on Life Satisfaction (FLZ<sup>M</sup>)

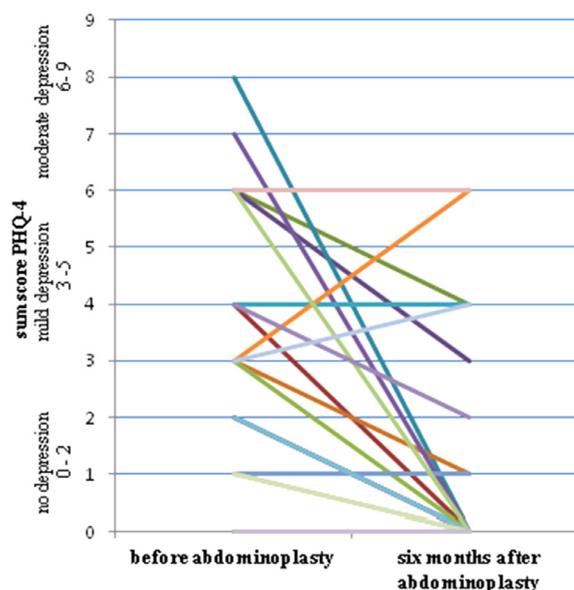
Examining the first module Questions on Life Satisfaction - general satisfaction - we noted that after surgery, our patients were significantly more satisfied in general ( $p=0.016$ ), especially with their leisure activities ( $p=0.003$ ) and sexual lives ( $p=0.046$ ). There was no difference between German healthy population and preoperative patients, whereas general life satisfaction was higher in postoperative patients ( $p=0.000$ ).

Taking a closer look at the second module of the Questions on Life Satisfaction - health - we found significant improvement in the ability to relax after abdominoplasty ( $p=0.002$ ). Compared to national norm data, sum scores proved that patients were significantly more satisfied with their health after abdominoplasty than before ( $p=0.026$ ). Before surgery, no differences in the sum scores could be seen.

In the third module Questions on Life Satisfaction - outer appearance - the increase in satisfaction was the highest and significant regarding the abdomen, waist, and hips (each  $p=0.000$ ). The sum score of the body image showed significant improvement ( $p=0.001$ ) corresponding to the satisfaction with the entire body ( $p=0.010$ ).

### Freiburg Personality Inventory

Comparing data of the preoperative groups to the German norm, we could not find any significant differences in the Freiburg Personality Inventory. After having undergone abdominoplasty, our patients showed significantly higher emotional stability than general German population ( $p=0.023$ ). Our patients had a high emotional stability before surgery, but it further improved significantly after abdominoplasty ( $p=0.029$ ).



**Fig. 2** Improvement of mental depression after abdominoplasty: results of the Patient Health Questionnaire-4.

Lines connect the individual sum scores of the Personal Health Questionnaire-4 before and after abdominoplasty. Each line represents one patient.

Sum score: rated as 0-2 = "no mental depression," 3-5 = "mild mental depression," 6-8 = "moderate mental depression," 9-12 = "severe mental depression".

### Rosenberg Self-Esteem Scale

Throughout the testing period, patients' self-esteem was significantly higher than self-esteem of the general German population ( $p=0.018$  preoperative and  $p=0.000$  postoperative). Although we found no significance, patients tended to increasingly value themselves postsurgery.<sup>12</sup>

### Patient Health Questionnaire-4

Before surgery, patients suffered from depression with an average of 3.3 in the Patient Health Questionnaire-4. The average in German female population is 1.9; hence, the result obtained with our patients showed significant difference ( $p=0.003$ ).<sup>16</sup> After surgery, patients reached on average 1.4 points and therefore had adapted to the norm. The difference from pre- to postoperative data was significant ( $p=0.004$ ). In detail, among the group of 22 patients, seven suffered from mild and six from moderate depression. The remaining patients showed no depressive symptoms. After abdominoplasty, there were no more signs of depression in almost all mild depressive patients. One mild depressive patient showed moderate depressive symptoms after surgery, but two patients remained mild depressive both before and after surgery. Almost all patients who had moderate depression in the PHQ-4 showed improvement: there was only one patient without changing the category, two patients could be downgraded from moderate to mild, and three from moderate depression to complete remission.

**Table 3** Results of the Patient Health Questionnaire-4.

	Mean	SD	N
Study group T0	3.3	2.4	22
Study group T1	1.4	2.1	22
Norm data (female) <sup>12</sup>	1.9	2.1	2686
p (t-test)			
T0 vs. T1	*0.004		
T0 vs. norm data	*0.002		
T1 vs. norm data	*0.266		

\* Statistically significant difference with  $p < 0.05$  (paired t-test)



**Fig. 3** Before (white underwear) and six months after (black underwear) aesthetic abdominoplasty.

## Discussion

Our results highlight the enormous effects of aesthetic surgery on quality of life. The combination of indication-specific and available validated questionnaires concerning quality of life after aesthetic surgery allowed us to detect significant changes in patients' life. The recently developed Body-QoL ® would have been an interesting supplement but was not available in German translation at the time of the study.<sup>19</sup>

As shown in the retrospective study, abdominoplasty leads to more satisfaction on life and better psycholog-

ical health.<sup>11</sup> Therefore, outer appearance must be seen as an important part of physical and mental health. For bariatric surgery, positive effects are verified by many studies, whereas there are little data available about aesthetic abdominoplasty.<sup>20</sup> Barone and colleagues proved that 67% of the patients before aesthetic abdominoplasty had psychological problems associated with the abdominal wall. In no other group of aesthetic surgery patients (e.g., face lifting, and rhinoplasty) the percentage of psychological pathologies was comparably high.<sup>8</sup> Our study group presented a similar percentage of psychological pathologies as that ob-

tained by Barone, with depressive symptoms in 57% of the patients.

Cook and colleagues had examined this subject beforehand: “*Is cosmetic surgery an effective psychotherapeutic intervention?*”<sup>21</sup> Finally, they did not observe significant improvements in patients’ mental health. No significant effects on general psychosocial functioning were found in a study on aesthetic abdominoplasty in 30 patients performed by Bolton, although he found improving effects on body image and sexual activity.<sup>22</sup>

Data collected in Germany and Switzerland by Margraf and colleagues demonstrated that aesthetic surgery in general improves patients’ lives in many areas including life satisfaction, mental and physical health, self-efficacy, and self-esteem.<sup>23</sup> It must be mentioned that only 4% of the patients had undergone aesthetic abdominoplasty. Saarniemi noted that imminent eating disorders improved after aesthetic abdominoplasty.<sup>24</sup>

Our data showed that patients with mild or moderate depression before surgery showed less pathologies after abdominoplasty. The coherence between the improvement of depressive symptoms and surgery could be described as follows: among others, mental depression is caused by learned helplessness. Brain regions show maladaptive responses to the stress factor helplessness.<sup>25</sup> As our patients had a high self-esteem, the loss of the former stress factor body image and the experience of learned resourcefulness could have helped them to have better mental health.<sup>26</sup>

As already mentioned, patients before abdominoplasty, although suffering from mental disorders, do not show difference from the general German population concerning self-esteem and emotional stability. They have realistic expectations about abdominoplasty and wish to become more attractive and more satisfied with their bodies. Margraf presented similar results in his essay: “*Psychological Health and Aims of Aesthetic Surgery Seekers*”.<sup>27</sup>

There is no doubt that the indication must be checked in detail before aesthetic surgery. In contrast to patients being depressed because of their outer appearance, patients with dysmorphophobia will barely be cured by aesthetic surgery.<sup>28</sup> For patients requiring abdominoplasty surgery, it leads not only to a harmonic outer appearance but also to more quality of life including social activity, satisfaction on body image, and less depressive disorders.

## Conclusion

The development of an appropriate conglomeration of questionnaires allowed us to evaluate changes in quality of life after aesthetic abdominoplasty prospectively. With the results of our previous retrospective study, we expanded questioning with prospective self-developed indication-specific questions and the Patient Health Questionnaire-4 for detailed information about mental health.

Finally, our data showed that abdominoplasty improves patients’ quality of life significantly. Before surgery, they had difficulties in social life, felt less attractive, and showed less satisfaction with body image than the reference group. After abdominoplasty, our patients were significantly more satisfied in the overall score of Questions on Life Satisfaction compared to both the preoperative situation ( $p=0.016$ )

and the general German population ( $p=0.000$ ). In the Questions on Life Satisfaction concerning health, patients were more able to relax with their corrected abdominal wall ( $p=0.002$ ). They were also more satisfied with their health after treatment than that reported in national norm data ( $p=0.026$ ). Body image was improved overall ( $p=0.010$ ), with the highest significance in the areas hips, waist, and abdominal wall (each  $p=0.000$ ). After abdominoplasty, emotional stability was increased ( $p=0.029$ ).

Evaluating quality of life before abdominoplasty, we detected symptoms of mild and moderate depression in more than the half of our participants. Similar data were described by other authors beforehand. After the treatment, depressive symptoms were significantly reduced in all individuals ( $p=0.004$ ).

Although in more than three quarters of our abdominoplasty cases there were minor complications such as hematoma, pain, and wound healing disturbances, patients were satisfied with the aesthetic results and would recommend it to a friend.

The question of the retrospective study “*Does Abdominoplasty Have a Positive Influence on Quality of Life, Self-Esteem, and Emotional Stability?*” can finally be answered: this prospective study confirmed the positive impact of aesthetic abdominoplasty on quality of life, social life, physical health, and, particularly, on mental health.

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## Conflicts of interest

None.

## Ethical approval

The study was approved by the ethics committee of our university (approval number 252/14 TUM).

Patients’ written consent was received for all illustrations.

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