

Retraction

Retracted: Computed Tomography Imaging Based on Edge Detection Algorithm in Diagnosis and Rehabilitation Nursing of Stroke Patients with Motor Dysfunction

Scientific Programming

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external

researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] T. Lu, B. Zhang, Y. Hu, and J. Chen, "Computed Tomography Imaging Based on Edge Detection Algorithm in Diagnosis and Rehabilitation Nursing of Stroke Patients with Motor Dysfunction," *Scientific Programming*, vol. 2021, Article ID 5499351, 10 pages, 2021.

Research Article

Computed Tomography Imaging Based on Edge Detection Algorithm in Diagnosis and Rehabilitation Nursing of Stroke Patients with Motor Dysfunction

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This study was to explore the effect of computed tomography (CT) images processed by image edge detection technology based on the improved Canny algorithm in the diagnosis of stroke patients with mobility dysfunction and to evaluate the clinical application value of early rehabilitation nursing (ERN). 114 patients who were diagnosed and treated in hospital and were suspected of having stroke movement dysfunction were selected as the research objects, and they were randomly divided into two groups, each with 57 patients. Patients in the control group were diagnosed with conventional CT examination, and the patients in observation group were diagnosed based on the CT images processed by the image edge detection technology based on the improved Canny algorithm. Patients in the observation group were divided into a group C and a group O. Patients (27 cases) in group O received rehabilitation training within 3 days after their vital signs were stabilized, and patients (30 cases) in group C received rehabilitation training within 3~7 days after their condition was stabilized. The CT image diagnosis effects on patients of the control group and the observation group were analyzed, and the ERN effect on patients of the C group and the O group was compared. The results showed that the mean square error (MSE) of the improved Canny algorithm (233.78) was smaller than that of the traditional Canny algorithm and Sobel and Prewitt algorithm, and the peak signal-to-noise ratio (PSNR) (27.89) was greater than that of the traditional Canny algorithm and Sobel and Prewitt algorithm ($P < 0.05$). Compared with the control group, the sensitivity (85.00% vs. 62.12%), specificity (70.59% vs. 36.36%), and accuracy (80.70% vs. 54.39%) of the examination method of the observation group were much higher ($P < 0.05$). In addition, the total effective rate of patients in group O was 89.47%, which was greatly higher than that of group C (70.18%), and the scores of Meyer index and Barthel index were also higher in contrast to those of group C ($P < 0.05$). In conclusion, the improved Canny algorithm showed a clearer display on the edge detection of CT images and good application effect. It showed the effect of making conventional CT more accurate in the examination and diagnosis of stroke patients, and it was worthy of clinical application and promotion. The research showed that the timelier rehabilitation training, the better the treatment effect of patients.

1. Introduction

Stroke is a cerebrovascular disease (CVD) that seriously endangers human health, showing the characteristics of high morbidity, high mortality, high disability, and high recurrence rate [1]. Due to people's unhealthy lifestyles and the aging of

the population, the incidence of stroke is increasing year by year [2]. Stroke is caused by cerebral ischemia and hypoxia due to cerebrovascular blockage or sudden blood vessel rupture and bleeding, causing brain cells and tissue necrosis. According to the cause of the disease, it is clinically divided into two categories: ischemic and hemorrhagic [3]. Stroke

should be treated as soon as possible after the acute onset of stroke. The longer the delay, the higher the risk of mortality and disability of the patient [4]. With the continuous advancement of medical technology, the survival rate of stroke patients has been improved, but patients will still experience various degrees of limb dysfunction after surgery [5], such as limb movement disorders, limb paresthesia, slurred speech, difficulty walking, and ataxia, which will significantly reduce the quality of life of patients [6] and increase the financial burden of patients' families. Multiple clinical studies have shown that choosing appropriate rehabilitation treatment and nursing programs after surgery is beneficial to the recovery of patients and is the most effective way to reduce the disability rate. The earlier rehabilitation training is carried out, the better the rehabilitation effect of patients is [7–9].

In the treatment of stroke, the judgment of the cause of the disease is very important, and the different causes of the disease will determine different treatment methods. Computed tomography (CT) imaging speed is fast, and head CT can provide basis for the diagnosis, differential diagnosis, curative effect observation, and prognostic observation of stroke [10]. Head CT uses X-rays to perform a tomographic scan of the head. Because the human body has different absorption coefficients of X-rays, the images will distinguish different tissues in the skull, diseased tissues, and normal tissues. Edge detection is an extremely important method of image analysis in image processing and computer vision [11]. The edge detection processing of CT images can highlight the edges of the images and realize the accurate distinction of image regions. The accuracy of medical image edge detection directly determines the accuracy of feature extraction, which in turn affects the subsequent work [12]. However, noise is often found in the process of image acquisition and storage, resulting in blurred images or imperfections that lead to inaccurate readings [13]. At this time, the image has to be smoothed. The Canny edge detection operator is composed of the first derivative of the Gaussian function [14]. The Canny edge detection operator is different from other operators such as Sobel in which it firstly smooths the image and then finds the derivative, and the derivative can detect the edge. Some research experts have also used the Canny edge detection algorithm to improve the edge blur caused by the compressed sensing algorithm in CT image reconstruction, and the obtained effect is good [15, 16]. However, it is found that the Gaussian filter is not ideal for the treatment of scattered salt and pepper noise, and the dual threshold of the Canny operator is mainly set by manual experience, which is poor in generality and compatibility in practical applications. Therefore, this study intended to improve the Canny operator and apply the improved Canny algorithm to perform edge detection processing on head CT images to provide help for the diagnosis and treatment of stroke patients.

2. Materials and Methods

2.1. Research Objects. In this study, 114 patients who were hospitalized from October 2018 to June 2020 and were diagnosed and treated in hospital due to suspected stroke

mobility dysfunction were selected as the research objects. Among the 114 patients, 68 were males and 46 were females, and they aged 40~75 years old, with an average age of 56.34 ± 8.78 years old. They were randomly divided into an observation group and a control group, with 57 people in each group. The patients in control group were diagnosed using conventional CT images, and the patients in observation group were diagnosed with CT images processed by the image edge detection technology based on the improved Canny algorithm. The patients in the observation group were again divided into a group C and a group O. Both groups received conventional drug treatment and were given anticoagulant and neurotrophic drugs. Then, the patients in group O received rehabilitation training within 3 days after the vital signs were stabilized, with the number of patients of 27, and the patients in group C received rehabilitation training within 3~7 days after the condition was stabilized (30 cases). The CT examination method used in the observation group was adopted to evaluate the curative effect. The diagnostic effects of CT images in the control group and the observation group were analyzed and compared, and the effect of rehabilitation nursing in group C and group O were compared for analysis. In the comparison of general data such as gender and age, the differences between the two groups of patients were not statistically significant ($P > 0.05$), and they were comparable. This study had been approved by the ethics committee of hospital.

The inclusion criteria were defined as follows: patients with no mental disorder, patients with normal organ functions, patients who signed the informed consents, and patients with no malignant tumor disease.

The exclusion criteria were defined as follows: patients who had not been able to undergo complete treatment and patients who had missing CT images.

2.2. CT Examination. In this study, a 16-slice spiral CT scanner from Siemens in Germany was used to scan the patient's skull. The scanning parameters were set as follows: tube voltage was 180 kV, tube current was 45 mAs, slice thickness was 5.0 mm, and screw pitch was 1.5 mm. Image analysis was performed by double-blind reading by 2 experienced physicians.

2.3. Image Edge Detection Based on Improved Canny Operator. CT had relatively high requirements for image edges. Although the Canny operator showed a good performance in the processing of Gaussian noise and the selection of edge details, it still showed an insignificant denoising effect on scattered salt and pepper noise in practical applications. It was necessary to rely on experience to determine the upper and lower thresholds that were not universal or not. The difference in the threshold would have a great impact on the edge detection results. The median filtering and iterative operations were applied in this study to improve these problems.

Firstly, the image could be smoothed.

The two-dimensional median filter expression was expressed as follows:

$$y_{ab} = \underset{A}{Med}\{f_{ab}\}. \quad (1)$$

In equation (1), y_{ab} represents the two-dimensional median value, $\{f_{ab}\}$ refers to the two-dimensional data sequence of the image to be processed, and A represents the size of the filter window, which determined the filter effect. According to the characteristics of brain CT, a window size of 3×3 was selected.

The Gaussian function is generally expressed as the following equation, in which σ represents the standard deviation of the Gaussian function:

$$H(a, b, \sigma) = e^{-(a^2+b^2/2\sigma^2)}. \quad (2)$$

Based on convolution of the original image $f(a, b)$ and the Gaussian filter, the smoothed image $g(a, b)$ could be obtained, which can be expressed as follows:

$$g(a, b) = f(a, b) * H(a, b, \sigma). \quad (3)$$

Secondly, the gradient magnitude and direction were calculated.

The smoothed gradient $g(a, b)$ adopted a 2×2 first-order finite difference approximation to calculate a and b partial derivative arrays as follows:

$$\begin{aligned} g'_a(a, b) &\approx G_a = \frac{g(a+1, b) - g(a, b) + g(a+1, b+1) - g(a, b+1)}{2}, \\ g'_b(a, b) &\approx G_b = \frac{g(a, b+1) - g(a, b) + g(a+1, b+1) - g(a+1, b)}{2}. \end{aligned} \quad (4)$$

They could be expressed by matrices as follows:

$$\begin{aligned} G_a &= \begin{pmatrix} 1 & -1 \\ 1 & -1 \end{pmatrix}, \\ G_b &= \begin{pmatrix} -1 & -1 \\ 1 & 1 \end{pmatrix}. \end{aligned} \quad (5)$$

The magnitude and azimuth of the gradient were calculated using the Cartesian coordinate to polar coordinate conversion equation as follows:

$$M(a, b) = \sqrt{G_a^2(a, b) + G_b^2(a, b)}, \quad (6)$$

$$\theta(a, b) = \arctan \frac{G_a(a, b)}{G_b(a, b)}. \quad (7)$$

In equation (6), $M(a, b)$ represents the gradient amplitude, and $\theta(a, b)$ in equation (7) refers to the gradient direction.

Thirdly, the nonmaximum value of gradient amplitude was suppressed.

The gradient amplitudes $M(a, b)$ of all pixels in the image with a pair of adjacent pixels along the gradient direction $\theta(a, b)$ were compared. If the gradient amplitude of this pixel was smaller than the gradient amplitude of a pair of adjacent pixels along its gradient direction, it was considered that this point was a nonedge pixel; otherwise, this pixel may be an edge pixel.

Fourthly, the double thresholds were obtained through iterative operations.

Based on the gray-scale statistical operation, the gray-scale maximum value Z_{\max} and the gray-scale minimum value Z_{\min} of the image to be processed could be obtained by taking $T_0 = (Z_{\max} + Z_{\min})/2$ as the initial iteration threshold.

The iterative loop was performed. In each loop, the threshold T_k gray value is greater than the threshold, and the other part was the background with all gray values less obtained above divided the image into two parts, one part was the foreground with all than the threshold. Then, the average gray value of the foreground was calculated, denoted as Z_a ; and then the average gray value of the background was calculated, denoted as Z_b . In equations (8) and (9), $f(x, y)$ represents the gray value of the pixel (x, y) on the image and $N(x, y)$ is the weight coefficient of the pixel (x, y) , which was valued at 1.

$$Z_a = \frac{\sum_{f(x,y>T_k)} f(x, y) \times N(x, y)}{\sum_{f(x,y>T_k)} N(x, y)}, \quad (8)$$

$$Z_b = \frac{\sum_{f(x,y<T_k)} f(x, y) \times N(x, y)}{\sum_{f(x,y<T_k)} N(x, y)}. \quad (9)$$

If the average gray value of the foreground and the background was undertaken as the new threshold T_{k+1} , then the following equation could be obtained:

$$T_{k+1} = \frac{(Z_a + Z_b)}{2}. \quad (10)$$

Next, it should judge if T_{k+1} and T_k were equal or not. If they were equal, the iterative operation can be stopped and the next step can be started; otherwise, equations (8) and (9) should be repeated for iterative loop operation.

Fifthly, the edge was screened using the double thresholds.

The finally obtained Z_a and Z_b were assigned to the high and low thresholds $[L_i, H_i]$ of the Canny operator. The pixel gradient amplitudes processed by nonmaximum value suppression were compared with Z_a and Z_b one by one. If a certain pixel gradient amplitude was met $M(x, y) > H_i$, then this pixel was an edge pixel; if $M(x, y) < L_i$ was satisfied, then this pixel was not an edge pixel; if $L_i < M(x, y) < H_i$ was met, there was a point larger than H_i in the pixel point in the neighborhood of the pixel point; it was also considered to be an edge pixel point, and vice versa if it was not an edge pixel point.

The gray level of nonedge pixels was set to 0. After processing, two parts of the edge image can be obtained, which were recorded as $H(i, j)$ and $L(i, j)$, respectively. The edge contours were connected in the high threshold area $H(i, j)$, and when connected to the endpoint, the weak edge was found in the low threshold area $L(i, j)$ to fill the edge gap of the high threshold area $H(i, j)$.

The flow chart of the improved Canny algorithm is shown in Figure 1.

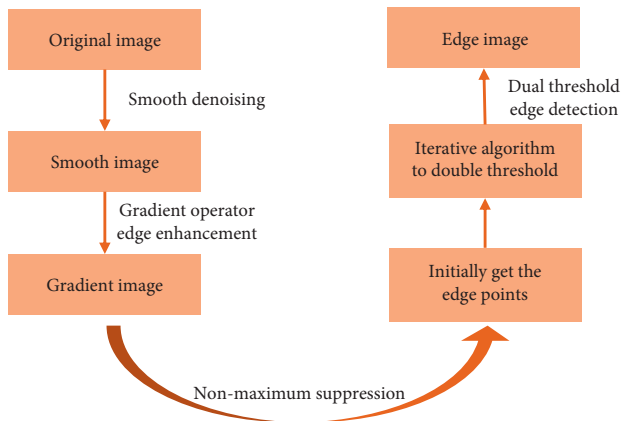


FIGURE 1: Image edge detection method based on the improved canny algorithm.

2.4. Rehabilitation Nursing. Patients in the observation group received early rehabilitation training in combination with conventional drug treatment. Rehabilitation training started within 72 hours after the condition was stabilized. The reference group adopted traditional rehabilitation nursing program, and the rehabilitation training was started within 72 hours to 7 days after the patient's condition was stable. The specific content of rehabilitation training was as follows. Firstly, it had to communicate and educate the patients and their families to understand the effects of rehabilitation training and the importance of rehabilitation training so as to arouse the enthusiasm of patients to participate in rehabilitation nursing training. Secondly, at the initial stage of rehabilitation, the patient should take the supine position when resting, keep the upper limbs cross-handled, and turn over regularly to reduce the compression of the patient's limbs and promote blood circulation. The patient should be assisted when turning over with one hand holding the patient's shoulders and the other hand on the side hip joints. The patient should be encouraged to move the fingers, elbow joints, knee joints, and other functional joints from time to time when lying in bed. In addition, the shoulders, legs, and other parts of the patient should be massaged. Thirdly, the patient was instructed to sit up at the bedside. The patient had to turn over to the side lying position and then get up to maintain a sitting state. The whole process should be carried out slowly, and after repeated exercises, it can perform the dynamic balance training to help patients' gradual transition to being able to perform standing training. Fourthly, when the patient was able to stand for training, he was instructed to perform walking training to train the ability of lower limbs firstly. The ankle joint was bent and the heel was kept off the ground, which should be repeated for many times. In addition, it could perform the knee flexion and extension training. The lower limbs were stretched to exercise the calf muscles. After that, the patient was required to try the independent walking training with the assistance of the parallel bars, and the patient was assisted to perform rotation training and exercise on body's balance ability and the distribution of the center of gravity when stopping. It had to pay attention to

the patient's various joints during the training process and avoid excessive exercise on the body. Fifthly, according to the patient's independent walking situation, weight training can be gradually increased. It had to pay attention to the safety of the patient during the weight training process to prevent the patient from falling and causing greater injury. In addition, the patient can perform rotation, flat lifting, and squatting by themselves to exercise his independent living ability, such as eating, washing, and going to the toilet.

For rehabilitation training, it should be based on each patient's own situation to develop a training plan, and the difficulty of training gradually transitioned from easy to difficult. It had to encourage the patients to take the initiative to train, supplemented by auxiliary training, and gradually increase the intensity of training. The level of training should adhere to the principle of not making the patient fatigue and not excessively injuring the joints.

2.5. Evaluation on Edge Detection Results. In order to evaluate the improved Canny algorithm, the Sobel and Prewitt algorithms were introduced to compare with the algorithm in this study. The algorithms were evaluated by mean squared error (MSE) and peak signal-to-noise ratio (PSNR). MSE is a standard to measure the image quality and positioning accuracy. PSNR is a standard that reflects the ability of images to resist noise and distortion. The calculation equations of them were as follows:

$$\text{MSE} = \frac{1}{M \times N} \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} [f(x, y) - g(x, y)]^2, \quad (11)$$

$$\text{PSNR} = 10 \lg \frac{255^2}{\text{MSE}}$$

In the above two equations, $f(x, y)$ is the detection value of the original image and $g(x, y)$ refers to the detection output value of the processed image. MSE refers to the expected value of the square of the difference between the estimated value of the parameter and the true value of the parameter. PSNR is an engineering project used between the maximum signal and the background noise. The unit of PSNR was dB. The larger the PSNR value, the less the image distortion.

2.6. Observation Indicators

- (1) Based on the clinical comprehensive diagnosis results, the sensitivity, specificity, and accuracy of the two CT examination methods of the control group and the observation group were analyzed and compared for the diagnosis of stroke patients.
- (2) The motor function Fugl-Meyer index and Barthel life ability index of patients in group C and group O were compared before and 6 months after the onset of rehabilitation nursing intervention. In addition, a comparative analysis of the improvement effect of the two groups of patients was also needed.

2.7. Statistical Methods. The SPSS 20.0 software was adopted to perform statistical analysis on the data. The mean \pm standard deviation ($\bar{x} \pm s$) was to represent measurement data, using t test; and the rate (%) was to represent the count data, using the chi-square test. $P < 0.05$ indicated statistically significant difference.

3. Results

3.1. Image Processing Results Based on Different Algorithms. Figure 2 shows the edge detection effects of the traditional Canny algorithm, the improved Canny algorithm, the Sobel algorithm, and the Prewitt algorithm. It can be known that the improved Canny algorithm showed the finest detection results and strong antinoise and antifalse edge capabilities; the detected edges were meticulous and continuous, and the detection accuracy of weak edges was higher than that of the traditional Canny algorithm, Sobel algorithm, and Prewitt algorithm. However, relatively speaking, the detection accuracy of the weak edge of the traditional Canny algorithm was higher than that of the Sobel algorithm and the Prewitt algorithm. Although the Sobel and Prewitt algorithms had smoothing effects, they could filter out some noise and remove some false edges, but they also smoothed the real edges, and the positioning accuracy was not high. When the noise was more and the image quality was poor, the Sobel and Prewitt algorithm had very limited noise suppression effect, and some false edges were retained. For the more obvious the edge of the lesion, the four algorithms can detect the edge more accurately, but when the image quality was not high and the edge of the lesion was blurred, the Sobel and Prewitt algorithms were more difficult to detect, and the traditional Canny algorithm could not detect edges as accurately as the improved Canny algorithm.

3.2. Comparison of Diagnosis Results Based on Different Algorithms. The traditional Canny, Sobel, and Prewitt edge detection algorithms were performed on the original images, the original CT images, and the images after edge detection. Figure 3 shows the comparison of the MSE values of the four algorithms, and Figure 4 shows the comparison of the PSNR values. It illustrated that the MSE values of the traditional Canny algorithm, Sobel, and Prewitt algorithms were all larger than those of the improved Canny algorithm, and the PSNR value was smaller than the improved Canny algorithm. It indicated that the improved Canny algorithm showed more stable image edge extraction accuracy, stable image quality, and strong antinoise and distortion ability than the other three algorithms.

3.3. Diagnosis Effect Analysis. Table 1 shows the statistics of the examination and diagnosis results of the patients in the control group, and Table 2 shows the statistics of the examination and diagnosis results of the patients in the observation group. Based on the calculation and analysis, it can be concluded that the sensitivity of the examination method in the control group was 62.12%, the specificity was 36.36%, and the accuracy was 54.39%; the sensitivity, specificity, and

accuracy of the examination method in the observation group were 85.00%, 70.59%, and 80.70%, respectively. After comparison, it was found that the diagnostic effect of the examination method of the observation group was better than that of the control group, as shown in Figure 5 ($P < 0.05$).

3.4. Clinical Treatment Effect of Two Groups of Patients. Figures 6 and 7 show the clinical treatment effects of 27 patients in group C and 30 patients in group O. They illustrated that the total effective rate of treatment in group O was 89.47% and that in group C was 70.18%, and the difference was statistically significant ($P < 0.05$). The improvement rate of patients in group O was 40.35%, and the rate of no change was 10.53%; and those in group C were 29.82% and 29.82%, respectively. Therefore, the clinical efficacy of rehabilitation training for stroke patients in group O was significantly better than that in group C.

3.5. Comparison of Fugl-Meyer and Barthel Scores between Two Groups of Patients before and after Rehabilitation Nursing. Figures 8 and 9 show the Fugl-Meyer and Barthel index scores of the two groups of patients before and after rehabilitation nursing intervention, respectively. Before the rehabilitation nursing, the Fugl-Meyer index and Barthel index scores of the two groups of patients had no great difference, which were not statistically significant ($P > 0.05$). After rehabilitation nursing intervention, the scores of the two groups of patients were improved. The Fugl-Meyer index and Barthel index scores of the observation group were greatly improved compared with those of the reference group, and the differences were statistically obvious ($P < 0.05$). It meant that the earlier the rehabilitation nursing training for stroke patients, the more beneficial it was to the rehabilitation of patients.

4. Discussion

Stroke is an acute cerebrovascular disease. Among the survivors, 50% to 70% of patients will have severe disabilities such as limb dysfunction, which brings a heavy burden to the family and society [17]. Stroke patients will cause nerve damage due to hypoxia in the local brain tissue. The theoretical mechanism of neural rehabilitation is currently generally accepted as the theory of neural plasticity and functional reorganization [18]. Starting from these two theoretical mechanisms, the application of early rehabilitation training can promote neuroplasticity and functional reorganization and can remarkably improve the activities of daily living of stroke patients and improve the quality of life [19]. Patient compliance and treatment norms can improve the effect of rehabilitation treatment and improve the prognosis of patients [20]. Medical imaging plays a huge role in the diagnosis and treatment of stroke, but the acquired CT images will be blurred or flawed due to the influence of various factors. The quality of CT images will affect the doctor's reading, and the edge detection of CT image can

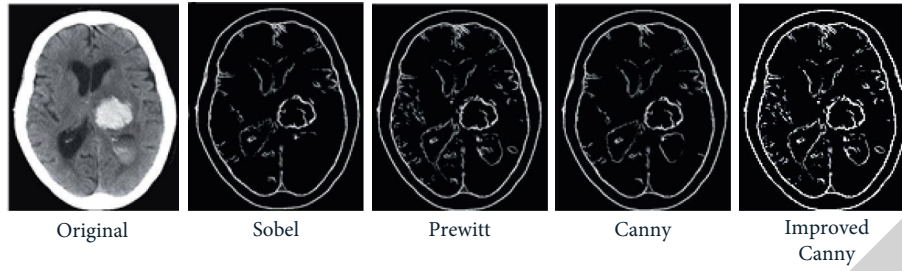


FIGURE 2: Edge detection results of different algorithms.

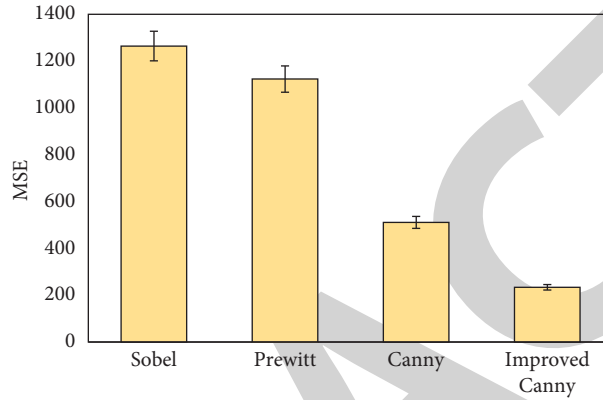


FIGURE 3: Comparison of the MSE values of the three algorithms.

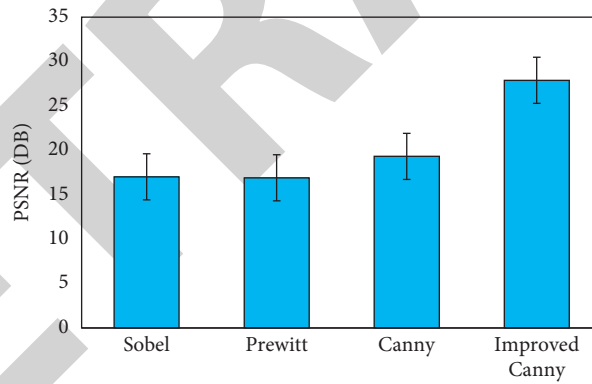


FIGURE 4: Comparison of the PSNR values.

TABLE 1: Statistics of examination and diagnosis results of patients in the control group.

	Comprehensive diagnosis (<i>n</i> = 57 cases)		Total
	Stroke	No stroke	
CT diagnosis (<i>n</i> = 57 cases)	Stroke	23	33
	No stroke	14	22
Total	37	22	57

show the condition of the patient’s focus more clearly, providing a basis for subsequent diagnosis and treatment.

Based on the above theoretical basis, the improved Canny algorithm was adopted to perform edge detection on

the head CT images of stroke patient in this study. The improved Canny algorithm was compared with the traditional Canny algorithm, Sobel, and Prewitt algorithms; it was confirmed that the improved Canny algorithm showed

TABLE 2: Statistics of examination and diagnosis results of patients in the control group.

	Comprehensive diagnosis (<i>n</i> = 57 cases)		Total
	Stroke	No stroke	
CT diagnosis (<i>n</i> = 57 cases)	Stroke	34	39
	No stroke	6	18
Total		40	57

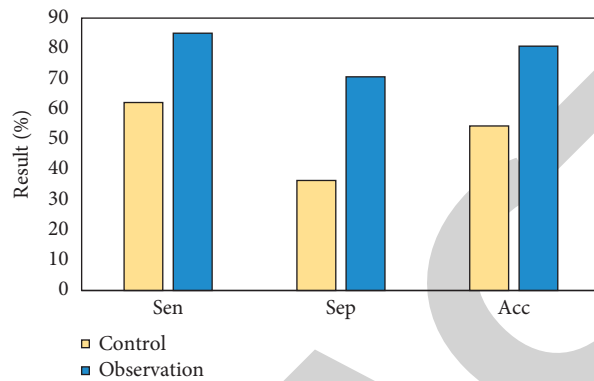


FIGURE 5: Comparison of diagnostic effects.

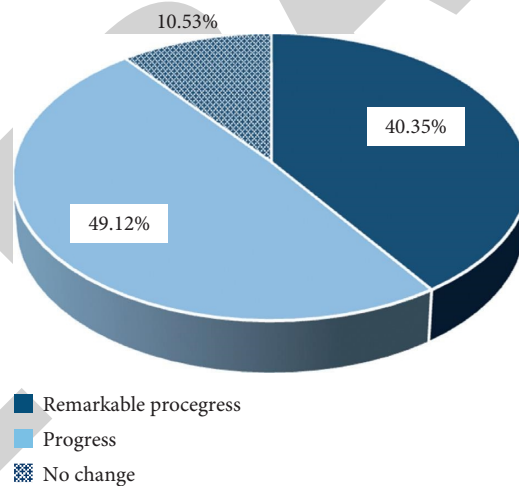


FIGURE 6: The clinical treatment effects of patients in the observation group.

good image accuracy and antinoise ability to filter out false edges and identify weak edges. The comparison of the CT examination methods between the control group and the observation group suggested that the sensitivity (85.00% vs. 62.12%), specificity (70.59% vs. 36.36%), and accuracy (80.70% vs. 54.39%) of the inspection methods for patients in the observation group were better than those of the control group ($P < 0.05$). The above results all showed the advantages of the improved Canny algorithm for CT image processing. Hsieh et al. [13] pointed out that the improved Canny operator can effectively detect the edge position of the object in the low-dose reconstruction process so that the image quality of CT reconstruction was better than other algorithms. Such results were consistent with the results of

this study. The research of Meng et al. [21] pointed out the robustness and reliability of the method and found good consistency. Goulart et al. [22] also proposed this method to help analyze the contraction activity of isolated muscle cells.

Regarding the application of rehabilitation nursing, the results showed that during the early rehabilitation and long-term rehabilitation nursing training, there were no obvious adverse events in the two groups of patients, suggesting that the above treatment rehabilitation methods were safe and effective. The Fugl-Meyer and Barthel scores of patients in group O after rehabilitation nursing were greatly improved compared with those before the rehabilitation nursing. Group C also achieved a certain degree of rehabilitation effect, but the effect achieved was very limited compared

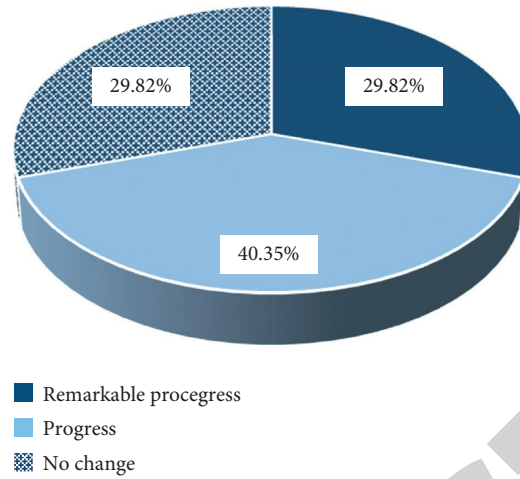


FIGURE 7: The clinical treatment effects of patients in the reference group.

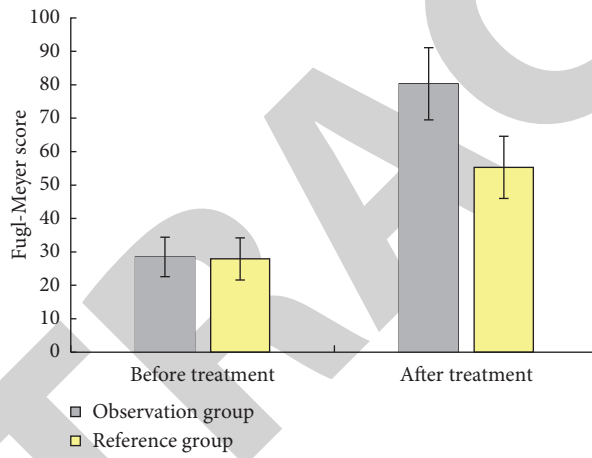


FIGURE 8: The Fugl-Meyer index score of patients before and after rehabilitation nursing intervention.

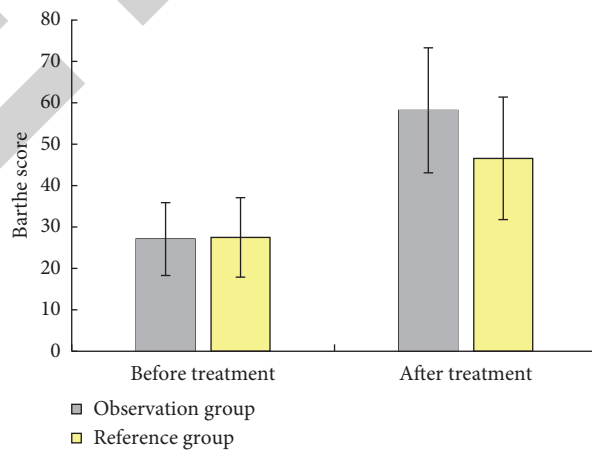


FIGURE 9: The Barthel index score of patients before and after rehabilitation nursing intervention.

with group O. Studies by Rose et al. [23] and Ghai et al. [24] showed that rehabilitation training had a certain effect on the improvement of stroke patients' motor ability. The result of rehabilitation training started within 72 hours after the condition was stable was better than that of conventional rehabilitation training. It was proved in this study that early intervention for stroke patients was safe and effective. Bernhardt et al. [25] also pointed out in the study that brain neurobiology showed that early and appropriate training will help recovery, which was consistent with this study. For acute stroke disease, interventional rehabilitation should be started as soon as possible and rehabilitation training should be started as soon as possible for stroke patients after their condition stabilizes.

5. Conclusion

The objective of this study was to explore the effect of CT images processed by image edge detection technology based on the improved Canny algorithm in the diagnosis of stroke patients with mobility dysfunction and to evaluate the clinical application value of rehabilitation nursing. The results revealed that the improved Canny algorithm had a clearer display on the edge detection of CT images and showed a good application effect. It showed a more accurate effect on the examination and diagnosis of stroke patients and was worthy of clinical application and promotion. It was found that the timelier rehabilitation training, the better the treatment effect of patients. There were shortcomings in this study. Specifically, the study was carried out in only one hospital, with fewer samples, and no more detailed grouping according to the severity of the patient's functional impairment. The exact time for early rehabilitation training had to be determined by further more detailed, large-scale, and multicenter research so as to maximize the intervention effect of early rehabilitation training.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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