Post-print: Nursing Care for Phlebitis Caused by Contrast Agent Extravasation During Magnetic Resonance Imaging

Authors: Liang Yinglin; Wu Xiujuan

Date: 2017-12-07T00:00:00+00:00

Abstract

Objective: To investigate the nursing measures and effects for phlebitis caused by contrast agent extravasation during magnetic resonance imaging scans.

Methods: A retrospective analysis was conducted on 50 patients with phlebitis caused by contrast agent extravasation during magnetic resonance imaging scans. Twenty-five patients who received routine nursing care were randomly assigned to the control group, while the other 25 patients who received effective nursing measures were assigned to the experimental group. Nursing satisfaction and nursing effectiveness were observed and compared between the two groups.

Results: The overall nursing satisfaction rate in the experimental group was higher than that in the control group, with a statistically significant difference (23% vs. 19%, $P<0.05$). The overall effective rate of nursing in the experimental group was also higher than that in the control group, with a statistically significant difference (25% vs. 22%, $P<0.05$).

Conclusion: Effective nursing measures have a prominent effect on patients with phlebitis caused by contrast agent extravasation during magnetic resonance imaging scans, can improve patient conditions, enhance treatment efficacy, and increase nursing satisfaction, and thus can be promoted for clinical application.

Full Text

Preamble

Journal of Molecular Imaging, Vol. 40, No. 3, 2017
doi: 10.3969/j.issn.1674-4500.2017.03.34 · 377 ·
ChinaXiv Partner Journal

Nursing Care for Phlebitis Caused by Contrast Agent Leakage During MRI Scanning

LIANG Yinglin, WU Xiujuan
Department of Radiology, Jiangmen Central Hospital, Jiangmen, Guangdong 529000, China

Abstract

Objective: To investigate nursing measures and their effectiveness for phlebitis caused by contrast agent leakage during magnetic resonance imaging (MRI) scanning.

Methods: A retrospective analysis was conducted on 50 patients who developed phlebitis due to contrast agent leakage during MRI scanning. Twenty-five patients who received routine nursing care were assigned to the control group, while another 25 patients who received comprehensive nursing interventions were assigned to the experimental group. Nursing satisfaction and treatment efficacy were compared between the two groups.

Results: The total nursing satisfaction rate in the experimental group was significantly higher than that in the control group (23% vs. 19%, $P<0.05$). The total effective nursing rate in the experimental group was also significantly higher than that in the control group (25% vs. 22%, $P<0.05$).

Conclusion: Effective nursing measures demonstrate outstanding benefits for patients with phlebitis caused by contrast agent leakage during MRI scanning. These interventions can improve patient conditions, enhance treatment outcomes, and increase nursing satisfaction, making them worthy of broader clinical application.

Keywords: magnetic resonance imaging; contrast agents; phlebitis

Introduction

Magnetic resonance imaging (MRI) serves as a crucial clinical diagnostic instrument, characterized by high detection rates and precise lesion localization, playing a significant role in both disease diagnosis and characterization [1-2]. Despite its clinical utility, MRI is not without notable problems, particularly contrast agent leakage. Since high-pressure injectors are fully automated devices that deliver contrast agents at high speeds and pressures, the contrast medium can easily extravasate from blood vessels under such pressure, triggering phlebitis [3-4]. This study summarizes the nursing measures and outcomes for 50 patients who developed phlebitis due to contrast agent leakage during MRI scanning. Our findings reveal that the experimental group receiving comprehensive nursing interventions achieved remarkable results, which we now report as follows.

1.1 General Data

We retrospectively analyzed the clinical data of 50 patients who developed phlebitis from contrast agent leakage during MRI scanning at our hospital between March 2014 and February 2016. Twenty-five patients who received routine nursing care were assigned to the control group, while another 25 patients who received comprehensive nursing interventions constituted the experimental group.

In the control group, there were 15 male and 10 female patients, aged 16-75 years with a mean age of 45.25±1.24 years. In the experimental group, there were 16 male and 9 female patients, aged 16-74 years with a mean age of 45.45±1.28 years.

Diagnostic Criteria: All selected patients met the diagnostic criteria for phlebitis outlined in *Vascular Surgery of Traditional Chinese Medicine* (1993) [5].

Inclusion Criteria: Patients with clear consciousness and normal communication ability; no severe cardiovascular or cerebrovascular diseases; life expectancy >6 months.

Exclusion Criteria: Patients with artificial cardiac pacemakers or prosthetic joints; pregnant patients; lactating patients; patients with critical illnesses.

There were no significant differences in clinical data between the two groups ($P>0.05$), ensuring comparability.

1.2 Methods

The control group received routine nursing measures, including patient positioning with limb elevation and anti-inflammatory treatment. The experimental group received comprehensive nursing interventions:

(1) **Allergy Management:** Many patients with phlebitis experience adverse reactions such as palpitations, headache, hypotension, and swelling due to contrast agent extravasation. Nursing staff administered anti-allergy medications and positioned patients in supine posture or with elevated limbs.

(2) **Health Education:** Nurses maintained good communication with patients, provided psychological counseling, explained the mechanisms of contrast agent leakage-induced phlebitis and related preventive measures, and alleviated negative emotions such as anxiety and fear. By building trust, nurses improved patient compliance and facilitated subsequent nursing procedures.

(3) **Symptom-Based Care:** For patients with venous redness but no swelling, nurses applied 75% alcohol to the affected area to reduce local skin temperature, improve blood circulation, and relieve pain.

Convolatulin transparent patches were applied along the venous pathway to improve local physiological conditions and eliminate inflammatory responses. For patients with local skin redness, swelling, or necrosis, nurses immediately elevated the affected limb and notified physicians for prompt management. For blister formation, sterile syringes were used to aspirate exudate, followed by povidone-iodine disinfection.

(4) **Environmental Care:** Nursing staff ensured fresh indoor air through regular ventilation, arranged fresh plants to improve the ward atmosphere, and enhanced overall patient comfort.

1.3 Evaluation Indicators

Nursing satisfaction and treatment efficacy were compared between the two groups.

Nursing Satisfaction: Evaluated using the "Patient Satisfaction Questionnaire" from *Nursing Ethics* (2006) [6], comprising 35 items scored on a 10-point scale each. Scores of 10-8 indicated very satisfied, 7-6 indicated satisfied, and 5-0 indicated dissatisfied. Total satisfaction rate = (very satisfied + satisfied) ÷ total number × 100%.

Treatment Efficacy:
- *Cured:* Complete disappearance of local redness and swelling
- *Markedly Effective:* Significant pain relief with visible improvement in skin color
- *Effective:* Partial relief of phlebitis symptoms
- *Ineffective:* No relief of pain or other symptoms

Total effective rate = cure rate + markedly effective rate + effective rate.

1.4 Statistical Methods

All data were processed using SPSS 21.0. Clinical data were expressed as percentages and analyzed using chi-square tests. Measurement data were expressed as mean ± standard deviation and analyzed using t-tests. $P<0.05$ was considered statistically significant.

Results

2.1 Comparison of Nursing Satisfaction Between Groups

The total nursing satisfaction rate in the experimental group was significantly higher than that in the control group ($P<0.05$, Table 1).

Table 1. Comparison of Nursing Satisfaction Between Groups (n=25, %)

[Experimental Group: 20 (80.0) very satisfied, 3 (12.0) satisfied, 2 (8.0) dissatisfied, 23 (92.0) total satisfaction rate]

[Control Group: 18 (72.0) very satisfied, 1 (4.0) satisfied, 6 (24.0) dissatisfied, 19 (76.0) total satisfaction rate]

2.2 Comparison of Treatment Efficacy Between Groups

The total effective rate in the experimental group was significantly higher than that in the control group (P<0.05, Table 2).

Table 2. Comparison of Treatment Efficacy Between Groups (n=25, %)
[Experimental Group: 20 (80.0) cured, 4 (16.0) markedly effective, 1 (4.0) effective, 0 (0.00) ineffective, 25 (100.0) total effective rate]
[Control Group: 17 (68.0) cured, 3 (12.0) markedly effective, 2 (8.0) effective, 3 (12.0) ineffective, 22 (88.0) total effective rate]

Discussion

Multiple factors contribute to contrast agent leakage during MRI scanning, including pharmaceutical properties, puncture techniques, and psychological factors [7-8]. Research indicates that contrast agents are highly viscous substances that, when extravasated, damage the circulatory system and irritate venous endothelial tissue, readily inducing phlebitis [9-10]. Venipuncture technique and equipment represent important factors in phlebitis development. Since contrast agents are administered using high-pressure injectors, operators must possess excellent technical skills [11-15]. Improper technique can result in needle penetration through blood vessels, causing contrast extravasation and subsequent phlebitis [16-17]. Clinical observations have identified poor venous condition as another contributing factor, as patients with compromised veins may experience impaired drug delivery and contrast extravasation [18-19]. Phlebitis can trigger serious complications such as myocardial infarction and dyspnea, posing significant threats to patient health and necessitating effective nursing interventions.

Tan Hui' s research [20] demonstrated that good psychological nursing can improve patient satisfaction and thereby enhance treatment outcomes. Our findings show that the experimental group receiving comprehensive nursing interventions achieved higher satisfaction and greater treatment efficacy compared to the control group receiving routine care. This is because our nursing staff immediately stopped the injection upon detecting contrast agent leakage and provided symptom-based care. These interventions not only improved local blood circulation and reduced redness and pain but also accelerated inflammation resolution. The high-quality nursing care improved overall nursing quality, thereby increasing both satisfaction and treatment efficacy. Our hospital provided psychological counseling to reduce patients' fear and anxiety during inflammation episodes, using warm language and appropriate body language to comfort patients and build rapport, which contributed to improved satisfaction.

In summary, implementing effective nursing measures for patients with phlebitis caused by contrast agent leakage during MRI scanning yields significant bene-

fits. These interventions can improve phlebitis conditions, accelerate recovery, enhance nursing satisfaction, and improve patient-provider relationships, making them worthy of clinical promotion.

References

1. 高桂秀, 杭宝明. 早期综合护理干预在预防碘造影剂所致静脉炎中的应用 [J]. 国际护理学杂志, 2016, 35(23): 3308-10.
2. 包肖娜, 于海波. 磁共振增强扫描匹配高压注射时静脉渗漏的护理 [J]. 中华现代护理杂志, 2010, 16(21): 2582-3.
3. 张爱东, 丁金立, 李宏军. 磁共振增强检查中对比剂钆喷酸葡胺不良反应的护理 [J]. 中国数字医学, 2016, 11(8): 94-6.
4. 周芬, 徐枫兰, 周红, 等. 毫米波与药物外敷治疗静脉炎和皮肤损伤的研究和临床护理 [J]. 中国医学创新, 2016, 13(8): 108-11.
5. 陈淑长. 中医血管外科学 [M]. 北京: 中国医药科技出版社, 1993.
6. 张涛, 唐宁. 护理伦理学 [M]. 南京: 东南大学出版社, 2006.
7. 杨雪洁. 微量泵结合 PICC 减轻 5-Fu 导致静脉炎的观察及护理 [J]. 包头医学院学报, 2015, 31(2): 112-4.
8. 杨鹏. 静脉输液气泡和静脉炎的预防和护理管理 [J]. 中国卫生产业, 2016, 13(30): 126-8.
9. 周凌珊. 预防性护理对化疗药物外渗致静脉炎的影响分析 [J]. 延安大学学报: 医学科学版, 2016, 14(2): 73-4.
10. 于彬, 陈霞. -七叶皂苷钠导致静脉炎的预防及护理 [J]. 继续医学教育, 2016, 30(4): 133-5.

Note: Figure translations are in progress. See original paper for figures.