CE

2.0 ANCC Contact Hours

History and Physical Examination of Hip Injuries in Elderly Adults

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Hip fracture is the most common injury occurring to elderly people and is associated with restrictions of the activities of the patients themselves. The discovery of a hip fracture can be the beginning of a complex journey of care, from initial diagnosis, through operational procedures to rehabilitation. The patient's history and physical examination form the basis of the diagnosis and monitoring of elderly patients with hip problems and dictate the appropriate treatment strategy to be implemented. The aim of this study is to discuss the different diagnoses of hip pain in a case study of an elderly woman who initially complained of pain in her right knee following a fall at home. It shows that musculoskeletal physical examination determined the management of the hip fracture that was found to be present. In addition, the aim of this article is to review diagnostic tests such as radiographs and recommend appropriate management and treatment of hip fractures in elderly patients.

Introduction

In the elderly population, falls are commonplace and these may be the cause of disability and physical harm, including fractures or soft tissue injuries. Hagino et al. (2004) suggested that falls from bed or standing height frequently resulted in a fractured hip. The growth of the elderly population globally will be reflected in a significant increase in the number of hip fractures presenting over the coming decades (Chevalley et al., 2007). Approximately 1.5 million cases of hip fracture occur worldwide each year and this is projected to reach 2.5 million by 2025 (Johnell & Kanis, 2006). In the United States, there were approximately 289,000 cases of hip fracture in 2010 (Stevens & Rudd, 2013). There are three main types of hip fracture that can be classified on the basis of their location (see Figure 1).

This article aims to explore the physical assessment of hip pain specifically due to a fractured hip. Consequently, it aims to identify the appropriate treatment that will diminish morbidity and mortality rates in elderly patients.

Case Study

Mrs. B, an 89-year-old woman, lived in a residential home and walked with a frame (walker). In the early hours of one morning, she was found on the floor of her room. She stated that she was trying to get out of bed to use her commode. She fell onto her right hip and began to complain of a pain in her knee. At the emergency department, a physical examination provided the observation that her right leg was externally rotated with a bruising of her right hip. An x-ray confirmed a right femoral neck fracture. She did not present any past medical history. The next morning, Mrs. B had surgery for open reduction and internal fixation of the fracture.

History Taking

History taking is important in sorting out the differential diagnosis in elderly patients. The notes concerning the patient's medical history should include the chief complaint, past medical history, family and social history, risk factors, usual activity, and any history of present or previous trauma (Price & Miller, 2010).

In their study, Cauley et al. (2008) noted that falls in old women were strongly associated with hip fractures. Mrs. B had a history of a fall on her right hip. Marks (2010) suggested that around 90% of hip fractures were associated with falls in elderly people. Assessing the mechanism of fall and the environment of the fall location could help with an appropriate diagnosis. However, Mrs. B complained of pain in her right knee. Kreder and Jerome (2010) suggested that, typically, hip pain radiates down to the anterior aspect of the knee. The examiner should ask the patient to describe the primary location of the pain and from where it radiated. Mrs. B located the pain as being in her right hip, which radiated to her knee. The examiner has to differentiate between the types of pain such as that present with monoarthritis, oligoarthritis, and polyarthritis (Marks, 2010). If the pain was localized only in the hip joint, it would be monoarthritis, usually caused by infection, trauma, bleeding diathesis, or inflammation (Huntley, Gibson, & Simpson, 2009).

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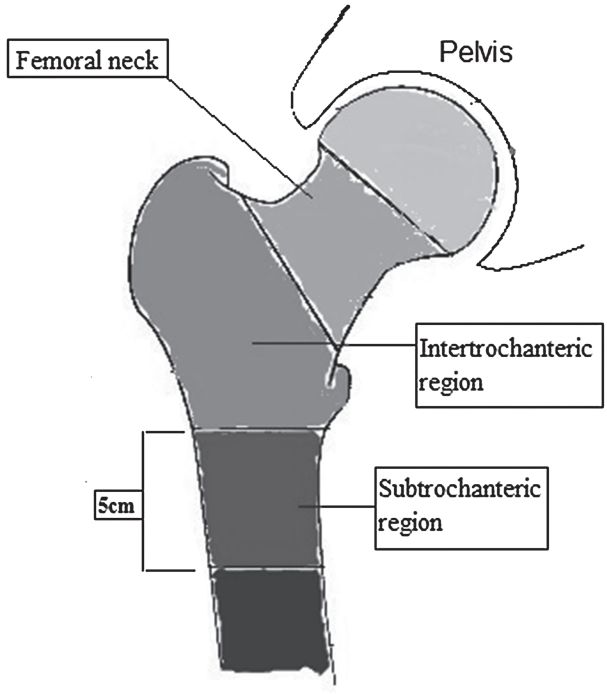

FIGURE 1. The regions where hip fractures occur.

As component of the history of symptoms of hip pain, information concerning the onset of symptoms, severity, and duration are essential in reaching an appropriate diagnosis. The source of the pain should be identified and an assessment of whether it becomes worse with movement or improves with rest should be made. If the patient suffers pain while at rest, it may be related to infection, tumors, or inflammation (Bickley & Szilaygi, 2010). Huntley et al. (2009) suggested that if the pain was sharp, stabbing, and aggravated by movement it might be associated with a fracture. The onset of pain may give the assessor a clue as to the diagnosis. A gradual onset of pain can be related to an arthritic condition, whereas a quick onset may be associated with fractures, ligamentous or meniscal tears (Siva, Velazquez, Mody, & Brasington, 2003). The examiner should identify from whether or not there is limited function, swelling, weakness, stiffness, and palpable snapping or clicking noises within the hip (Flannery, Green, Harmon, & Masterson, 2011).

If the patient describes the stiffness as difficult, painful, or restricted movement, in the musculoskeletal evaluation, a diagnosis of rheumatoid arthritis and/or osteoarthritis may be made (Woolf & Pfleger, 2003). Usually, weakness is a description of the loss of strength or general fatigue. The presence of weakness may suggest a joint disorder or peripheral nerve lesion (Huntley et al., 2009). Swelling is an important symptom that needs to be described in both the medical history and the physical examination. Mrs. B complained of the inability to stand and said she felt the sharp pain only after falling from the bed. A swelling was observed in the vicinity of her right hip.

A previous medical history of hip pain is important as a guide as it may exclude some other differential diagnosis. For example, in hemophilia it may be associated with arthropathy and in sickle cell disease it may be related to osteonecrosis of the hip (Huntley et al., 2009). However, there is a need to identify comorbid conditions such as diabetes mellitus, ischemic heart disease, and obesity (Juhakoski, Tenhonen, Anttonen, Kaupinen, & Arokoski, 2008). Mrs. B reported that she did not have any disease and was not taking any medication, vitamins, or herbs. In addition, she did not have any history of previous falls or surgery and was not allergic to any medication or food.

Huang et al. (2012) indicated that the use of medication among the elderly population can place them in greater risk of hip fracture because of changes in body composition, total body water, and hepatic and renal function. Several types of drugs may be associated with falls in the elderly such as cardiovascular drugs such as digoxin and diuretics (de Groot et al., 2013), benzodiazepines (van Strien, Koek, van Marum, & Emmelot-Vonk, 2013), antidepressants (Coupland et al., 2013), antiepileptics (Tsiropoulos et al., 2008), and antipsychotropics (Echt, Samelson, Hannan, Dufour, & Berry, 2013). Postoperatively these medications may be controlled or doses reduced to lower the risk of future hip fractures.

The examiner should ask the patient about his or her family history because of the hereditary basis of some diseases such as Marfan's syndrome, osteoarthritis, rheumatoid arthritis, and osteoporosis. All of these could be associated with musculoskeletal disorders (Oliver & Silman, 2009). Mrs. B stated that she was unsure of her family history in this respect.

There are many social factors, associated with musculoskeletal system, which should be considered while obtaining the medical history. Sun et al. (2011) suggested that a history of smoking was related to bone metastases. Other factors such as alcohol abuse could be correlated with a higher risk of osteoporotic fractures (Berg et al., 2008). Furthermore, nutrition is very important in elderly people because they need healthy bones. Vondracek and Linnebur (2009) demonstrated that vitamin D deficiency could enhance susceptibility to fractures in older people.

The history of the patient's activity levels before the incident should include their ability to walk and use the stairs and the toilet. This information is important for an accurate assessment of the patient's functional capacity. In this regard, Mrs. B lived in a residential home and used to move around by using a walker.

Physical Examination

Obtaining the patient's medical history is important in guiding the examiner when undertaking the physical examination. The patient is usually exposed during the examination. Therefore, the examiner should ensure that the patient has an appropriate level of privacy and his or her dignity is maintained. Domb, Brooks, and Byrd (2009) suggested that the physical examination should be systematic and comprehensive to avoid the possibility of missing clinical findings. As Mrs. B complained of hip pain, the examiner should have undertaken an examination of the hip by carrying out a head-to-toe examination. The physical assessment of the

musculoskeletal system involves both inspection and palpation (Perkin, 2008). In addition, the examiner should assess the range of movement and function of the related joints and soft tissue (Bickley & Szilaygi, 2010). Mrs. B's physical examination included inspection, palpation, assessment of her range of movement, and a special test for the hip. Table 1 lists other possible differential diagnosis of hip pain.

Inspection

The inspection begins with the patient's general appearance. The examiner inspects the patient for any scars indicating previous surgeries. Skin changes such as a rash or psoriasis, which may be present around the umbilicus, hairline, and scalp may be associated with Reiter's syndrome (Perkin, 2008). Identifiable skin lesions on the palms, fingers, ears, and scalp may be related to systemic lupus erythematous (Kalla, 2011). The examiner should look for nodular swellings such as Heberden's or Bouchard's in the interphalangeal joints that may indicate osteoarthritis of the hand (Zacher & Gursche, 2003). Inspection of the eye should be undertaken, looking for scleritis and episcleritis that can be associated with rheumatoid arthritis or vasculitic disorder (Huntley et al., 2009). Consequently, if the patient has rheumatoid arthritis, it may be associated with femoral head osteonecrosis caused by avascular necrosis (Dutton, 2008).

The examiner should screen the movement of "GALS" that includes gait, arms, legs, and spine to identify any neurological or functional deficits. However, Mrs. B reported hip pain and swelling in the right hip area. In this situation, the examiner had to be careful to avoid any further injury to the patient during examination.

Table 1. Differential Diagnosis for Hip or Leg Pain

Source of Pain	Diagnosis
Bone	Fracture—A vascular necrosis of the femoral head
	Primary neoplasm—metastatic disease
Joint	Osteoarthritis—inflammatory arthritis—septic arthritis
	Crystalloid arthritis—osteoid osteoma—osteitis pubis—acetabular tear
Muscle, tendon, bursa	Contusion—iliotibial band syndrome—muscle strain—tendonitis
	Trochanteric bursitis—iliopsoas bursitis—piriformis syndrome
	Myositis ossificans
Spin, neuropathic source	Disorder of the lumbar disc—lumbar spinal stenosis—sciatica—coccygodynia
	Meralgiapatesthetica
Others	Hernia—abdominal pathology—pelvic pathology
	Referred pain from knee, ankle, or foot

Note. Reprinted with permission from "Hip Fractures in Adults," by L. Brunner, L. Eshilian-Oates, and T. Kuo, 2003, *American Family Physician*, 67(3), p. 539.

The examiner starts the inspection of the hip by assessing the patient's gait through observation of the stance and swing. The examiner should evaluate the patient's posture, foot position, movement balance, and coordination (Dutton, 2008). Mrs. B was unable to bear weight, which suggested a severe problem.

Palpation

The first step in palpation is to keep the patient in a supine position and palpate the hip joint. The examiner determines the position of the iliac crests that are located in the same horizontal plane, at the right angle of spine. If this is not present, this could indicate deformity of the hip (Perkin, 2008). The examiner palpates the greater trochanter and if there is tenderness the pain may be associated with trochanteric bursitis or a psoas abscess (Bickley & Szilaygi, 2010). Similarly, patients may present with tenderness in the lesser trochanter and ischial tuberosity, which are commonplace in sports injuries (Huntley et al., 2009). The examiner palpates the femoral nerve, artery, and lymph nodes at the level of the inguinal ligament. If the lymph nodes are enlarged, this may indicate an infection in a lower extremity or the pelvis (Bickley & Szilaygi, 2010).

Range of Motion

The assessment of the range of motion at the hip joint includes observation of the flexion, extension, abduction, adduction, and rotation of the limb. With the patient in a supine position, the examiner rolls the leg medially and laterally and externally at the hip (Martin, 2005). The normal range of these on both sides is to an angle of 45°. In Mrs. B's case, the external rotation of the right leg was more than 45° and the left leg had a normal range of movement.

The other test, which can be used to evaluate hip flexion, is performed by the examiner placing his hand on the patient's pelvis and, then, asking him or her to bend the knee to the chest (normal range is 120°; Nofsinger & Kelly, 2007; see Figure 2). A restriction of flexion can be a sign of a deformity of the hip. Mrs. B could not complete flexion of her right leg. To evaluate hip extension, the patient should be placed in a prone position and, supporting the pelvis with one hand, lifts each leg by the other hand (normal range is 0–20°; Nofsinger & Kelly, 2007). Mrs. B could not perform the extension test

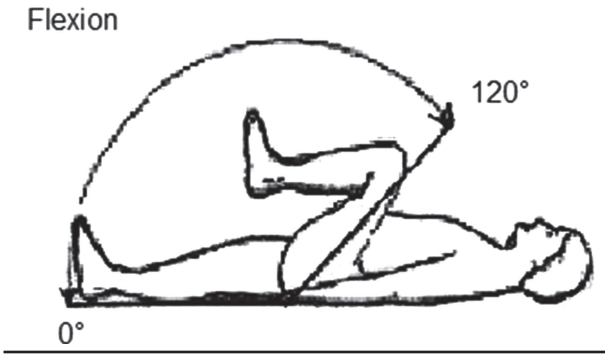

Figure 2. Movement of the hip Flexion knee bent.

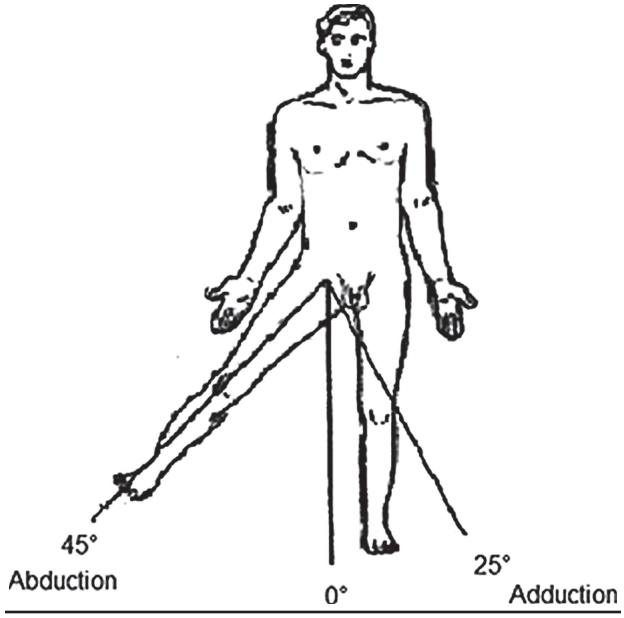

FIGURE 3. Abduction and adduction of the hip joint.

because of pain and it was not performed to avoid further injury to the hip.

To evaluate abduction, the examiner places his hand on the pelvis and then abducts the leg until the pelvis starts to tilt (normal range is 45°). In the adduction, the leg should cross over the other and continue medially (normal range is 25°; Shanmuganandan, Bhakuni, & Kartik, 2011; see Figure 3). If there is restriction in abduction, it may be related to osteoarthritis of the hip (Bickley & Szilaygi, 2010).

Measurement and Special Tests

Measurement of the leg should be a routine part of the physical examination (Byrd, 2007). The patient should be in a supine position. The true length of the limb must be measured from the anterior superior iliac spine to the medial malleolus (Huntley et al., 2009). Typically, shortening of the lower limb can be present in fractures, Perthes' disease, hip dislocation, and septic arthritis (Huntley et al., 2009).

Trendelenburg's test, in which the patient stands on one leg, and then the other, can identify any abnormality of the hip or muscle weakness (Perkin, 2008). The Thomas test is another test that can be utilized to identify any fixed flexion deformity (Huntley et al., 2009). Both Trendelenburg's and Thomas tests could not be done in Mrs. B's case as they may have caused more injury to the hip joint.

In conclusion, evaluation of the range of motion in Mrs. B's right hip joint showed that it was externally rotated. The greater trochanter of the right femur was tender. The leg abduction and adduction were restricted because of pain.

Diagnostic Test

An x-ray is essential in evaluating the musculoskeletal system of a patient who is unable to walk. The most

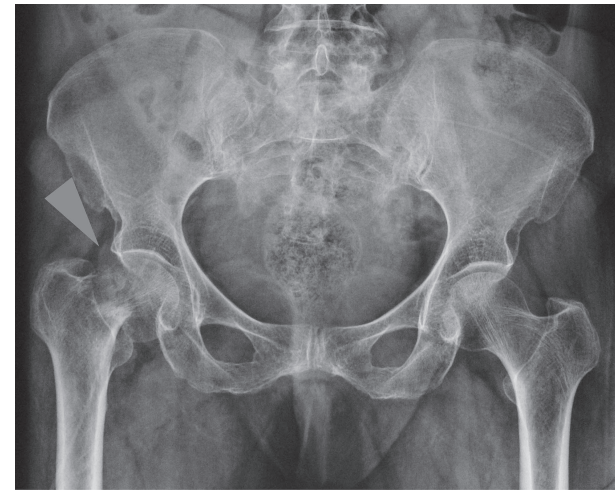

FIGURE 4. Anteroposterior of pelvis with both hip joints; view shows fractured hip.

valuable diagnostic study is the x-ray that can detect any deformity or fracture. Two orthogonal views should be taken: anteroposterior and lateral views of the pelvis and hip joint. The anteroposterior view should show the fracture line, obliquity, and the quality of the bone, and the lateral view is helpful in assessing the posterior combination in fractures (Kumar, Gubbi, Abdul, & Bisalahalli, 2008). Mrs. B's x-rays showed a right femoral neck fracture. Figures 4 and 5 show anteroposterior and lateral views of right femoral neck fracture.

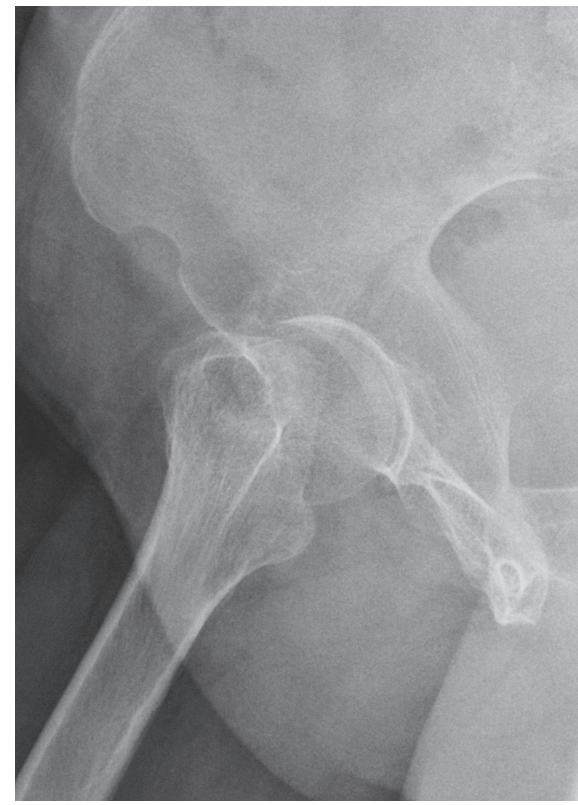

FIGURE 5. Lateral radiograph view of hip joint with different angulation of the fracture side.

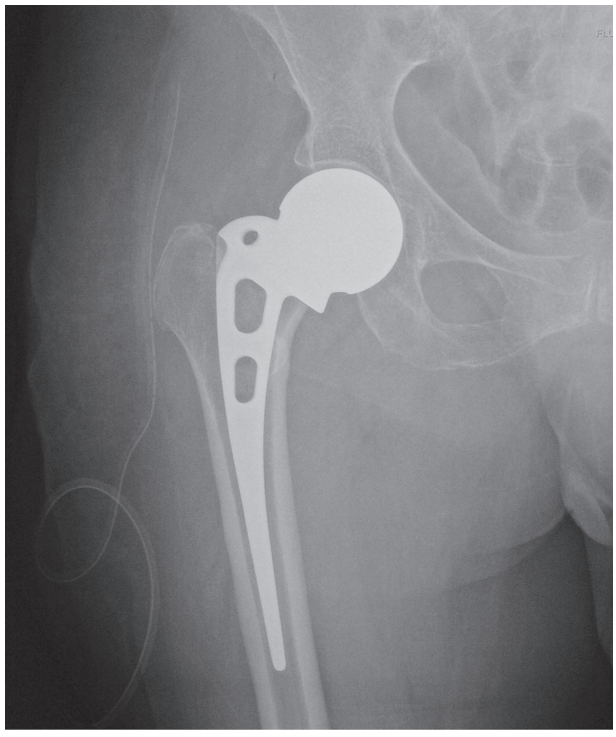

FIGURE 6. Postoperative radiograph hemiorthoplasty.

If the hip fracture is nondisplaced, it may be missed by the x-ray (Adams, Mayer, Hamming, & Zura, 2010; Laurin, Jonsson, & Jonsson, 2004). Several studies have suggested that magnetic resonance imaging can detect 100% of fractures and could be useful in identifying the details of fractures (Bartonice, Sprindrich, Skala-Rosenbaum, & Fric, 2007; Frihagen, Nordsletten, Tarig, & Madsen, 2005; Hossain, Barwick, Sinha, & Andrew, 2007).

Diagnosis and Management

The review of Mrs. B's history, the physical examination, and the evaluation of the x-rays suggested that she had a displaced fracture of femoral neck. These fractures happen if more stress is placed on the bone than can be absorbed (Gunta & Hightower, 2010).

An electrocardiogram (ECG) is an important investigation for elderly patients with hip fractures. Fleisher et al. (2007) suggested undertaking ECG in the emergency department to provide necessary data for the assessment of the cardiac risk. Equally, the British Orthopaedic Association (2007) and Scottish Intercollegiate Guideline Network (2009) recommended that, for patients with hip fractures, there should be quantification and a record made of full blood cell counts, urea, and electrolytes.

Pain can be severe after hip fracture. In a randomized study, Monzon, Vazquez, Jauregui, and Iserson (2010) compared two methods of pain relief and found that, after hip fractures in elderly patients, systemic nonsteroidal analgesics were more effective than a regional block. However, following a systematic review of 83 studies, Abou-Setta et al. (2011) suggested that nerve blockades were more effective in reducing pain in hip fractures.

In a Cochrane systematic review, Handoll, Queally, and Parker, (2011) evaluated 11 randomized trials. The evidence showed that skin or skeletal traction of hip fractures in adults was of no benefit in relieving the accompanying pain. Having evaluated their methodologies, Handoll et al. (2011) concluded that their studies were at risk of bias.

Accordingly, open reduction and internal fixation surgery are recommended for hip fracture. Many factors are involved in the selection of the type of surgery performed. This depends upon the patient's age, the severity of the injury, and comorbidities such as osteoporosis (Brunner, Eshilian-Oates, & Kuo, 2003). A number of studies have recommended arthroplasty for patients older than 70 years with displaced neck of femur fractures (Aleem, Karanicolas, & Bhandari, 2009; Gjertsen et al., 2010; Nicolaides et al., 2011). Figure 6 shows an x-ray film of the hip after fixation with hemiarthoplasty.

The surgery should be performed as early as possible. Several researchers revealed that, among patients with hip fracture, early surgery can lower the risk of mortality, postoperative pneumonia, and pressure sores (Lefaivre et al., 2009; Novack, Jotkowitz, Etzion, & Porath, 2007; Simunovic et al., 2010; Shiga, Wajima, & Ohe, 2008).

Conclusion

Hip fractures among elderly people are commonplace. The treatment of these injuries should be through a systematic approach because there is a possibility of many different diagnoses arising among elderly patients with hip joint pain. An understanding of the patient's medical history, careful physical examination, and an evaluation of the x-rays are very important in accurately diagnosing a hip fracture. In Mrs. B's case, other investigations of her right hip joint suggested a femoral neck fracture. This case study outlined the recording of the patient's history, the physical examination of hip pain, and the relevant diagnostic and laboratory tests to be carried out. The latest evidence supports the importance of early treatment in reducing the risk of mortality in elderly people.

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