Introduction

Rapidly destructive arthrosis (RDA) is an unusual, poorly diagnosed disease. It was firstly reported by Forestier in 1957 and a standardized definition was provided by Lequesne in 1970: 50% articular space narrowing in 1 year or femoral head destruction >2 mm in 1 year (1). The disease diagnoses that are only based on radiographic findings can be inconclusive. In some cases, they are easily misdiagnosed as rheumatoid arthritis, neuroarthropathy, septic arthritis, osteonecrosis of the femoral head, seronegative arthritis or osteoarthritis (OA). But in fact, the clinical, laboratory and pathologic symptoms of RDA are not in accordance with these diseases. The purpose of this systematic review is to investigate the clinical and...
pathophysiology features to facilitate correct diagnosis and prompt appropriate treatment of RDA.

**Materials and methods**

A comprehensive review of literature was undertaken using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines with no language restrictions. Searches were conducted using the following databases: PubMed, Embase, Cochrane Library, Springer, and the Google Scholar search tool. The following keywords were used: “rapidly destructive osteoarthritis”, “rapidly destructive arthropathy”, “rapidly destructive coxarthrosis”, “rapidly destructive arthrosis”, “rapidly destructive arthrosis of the hip”, “rapidly progressive osteoarthritis”, “Postel’s osteoarthritis”, “destructive osteoarthrosis” and “rapid destructive coxopathy”. Two researchers selected potentially relevant abstracts and obtained full copies of the articles. In addition, the references of the articles were reviewed.

**Criteria for eligibility**

The studies selected were original clinical articles that addressed RDA in elderly patients with no language restrictions. Cases with pigmented villonodular synovitis, pathological bone fractures and neuroarthropathy—i.e., Charcot joint—were excluded. Date limits were set from the inception of the journal to March 2018.

**Data extraction**

The following data were extracted from the eligible articles and case studies: type of study, age, gender, comorbidities, symptoms and signs, diagnostic modalities, treatment and outcome.

**Statistical analysis**

As the majority of the data collected were from case reports and case series, statistical analysis was not possible. Descriptive statistics were employed where suitable.

**Results**

**Literature search**

After omitting repetitions and studies which did not fulfil the selection criteria, 23 case reports or case-control studies were included in the analysis. All of these studies were retrospective. Fourteen were reported in Asia (2-15), six in Europe (16-21) and three in America (22-24). In total, 17 detailed patient cases were included (one article reported two cases, see Table 1). Seven case-control studies and case series including 164 patients were also studied (Table 2). We also reviewed additional relevant articles to facilitate the development of the discussion. The literature search flowchart could be found in Figure 1.

**Epidemiology**

**Age**

A total of 17 cases reported the age of patients. The mean age was 69.2 years (range, 37–81 years). There were 3 patients under 60 years (17.6%) with a mean age of 50.3 years (range, 37–57 years), and 14 patients over 60 years (82.4%) with a mean age of 73.3 years (range, 66–81 years). The seven cohort studies reported a total of 164 cases, with a mean age of 70.5 years.

**Gender**

All studies (181 cases) included 37 males (20.4%) and 144 females (79.6%)

**Disease bilaterality**

Among all reported studies (181 cases), bilateral arthropathy was found in three cases (1.7%). In the majority (178 cases), RDA occurs unilaterally.

**Diagnosis**

The most commonly accepted diagnosis criteria of RDA was joint space loss occurring at a rate greater than 2 mm per year or if more than 50% of joint space was lost in one year, reported by Lequesne in 1970. RDA was often misdiagnosed as another disease, including rheumatoid arthritis, neuroarthropathy, septic arthritis, osteonecrosis of the femoral head, seronegative arthritis and osteoarthritis.

**Radiological findings**

**X-ray**

In all patients, the weight-bearing area of the femoral head was flat. The articular cartilage was absent and the subchondral bone was destroyed.

**Magnetic resonance imaging (MRI)**

All patients had hip joint effusion and evidence of synovitis.
<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Age</th>
<th>Gender</th>
<th>BMI</th>
<th>Affected side</th>
<th>Comorbidities</th>
<th>Trauma</th>
<th>Course of disease</th>
<th>Blood test</th>
<th>Bone marrow edema</th>
<th>Diagnostic modalities</th>
<th>Early subchondral fracture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huerfano</td>
<td>2017</td>
<td>76</td>
<td>F</td>
<td>–</td>
<td>Right</td>
<td>DM</td>
<td>No</td>
<td>6 W</td>
<td>Normal</td>
<td>Acetabulum, femoral head and neck and the irregular focal high-intensity bands</td>
<td>X-ray + MRI</td>
<td>Yes</td>
</tr>
<tr>
<td>Yamamoto</td>
<td>2010</td>
<td>57</td>
<td>F</td>
<td>19.7</td>
<td>Bilateral</td>
<td>Hyperlipidemia</td>
<td>No</td>
<td>10 M</td>
<td>Normal</td>
<td>–</td>
<td>X-ray</td>
<td>Yes</td>
</tr>
<tr>
<td>Celik</td>
<td>2015</td>
<td>78</td>
<td>M</td>
<td>–</td>
<td>Bilateral</td>
<td>–</td>
<td>–</td>
<td>2 Y</td>
<td>ESR =34 mm/h</td>
<td>–</td>
<td>X-ray</td>
<td>Yes</td>
</tr>
<tr>
<td>Laroche</td>
<td>2002</td>
<td>67</td>
<td>M</td>
<td>–</td>
<td>Left</td>
<td>Coronary heart disease diabetes mellitus occlusive arterial disease</td>
<td>–</td>
<td>3 M</td>
<td>ESR =25 mm/h; CRP bone edema =10 mg/L</td>
<td>X-ray + MRI</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Yun</td>
<td>2012</td>
<td>67</td>
<td>F</td>
<td>19.9</td>
<td>Left</td>
<td>Rheumatoid arthritis</td>
<td>No</td>
<td>6 M</td>
<td>ESR =23 mm/h; CRP =79.5 mg/L; RF =50 IU/mL</td>
<td>–</td>
<td>X-ray</td>
<td>–</td>
</tr>
<tr>
<td>Yun</td>
<td>2012</td>
<td>67</td>
<td>M</td>
<td>16.9</td>
<td>Left</td>
<td>Rheumatoid arthritis</td>
<td>No</td>
<td>6 M</td>
<td>ESR =75 mm/h; CRP =418.5 mg/L; RAF =47 IU/mL</td>
<td>X-ray + MRI</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Yang</td>
<td>2011</td>
<td>66</td>
<td>M</td>
<td>–</td>
<td>Right</td>
<td>No</td>
<td>No</td>
<td>6 M</td>
<td>ESR =31 mm/h; CRP =24.5 mg/L</td>
<td>–</td>
<td>X-ray + MRI</td>
<td>Yes</td>
</tr>
<tr>
<td>Nishida</td>
<td>2005</td>
<td>74</td>
<td>F</td>
<td>22.8</td>
<td>Right</td>
<td>A history of a vertebral fracture</td>
<td>No</td>
<td>17 M</td>
<td>–</td>
<td>Femoral head</td>
<td>X-ray + MRI</td>
<td>YES</td>
</tr>
<tr>
<td>Fukui</td>
<td>2015</td>
<td>77</td>
<td>F</td>
<td>22.5</td>
<td>Left</td>
<td>No</td>
<td>No</td>
<td>5 M</td>
<td>–</td>
<td>Femoral head and X-ray + MRI</td>
<td>X-ray + MRI</td>
<td>Yes</td>
</tr>
<tr>
<td>Suzuki</td>
<td>2018</td>
<td>80</td>
<td>F</td>
<td>–</td>
<td>Right</td>
<td>Hypertension and dyslipidemia</td>
<td>No</td>
<td>3 M</td>
<td>–</td>
<td>–</td>
<td>X-ray + CT</td>
<td>Yes</td>
</tr>
<tr>
<td>Homma</td>
<td>2014</td>
<td>80</td>
<td>F</td>
<td>–</td>
<td>Left</td>
<td>Right postoperative THA</td>
<td>No</td>
<td>2 M</td>
<td>–</td>
<td>Acetabulum, femoral head and neck and the irregular focal high-intensity bands</td>
<td>X-ray + MRI</td>
<td>–</td>
</tr>
</tbody>
</table>

Table 1 (continued)
Diffuse signal abnormalities were found in the marrow of the femoral head and neck. None of the patients exhibited chondrocalcinosis (pelvis, knees), osteoarthritis radiographically or histopathologically. Low signal intensity occupied the whole femoral head on T1-weighted images. The same area showed high signal intensity on T2-weighted images. A small low-intensity line was observed at the weight-bearing area (25).

**Potential risk factors**

**Body mass index (BMI)**

Seven cases reported the BMI of the patients. Six patients had the standard BMI (range, 19.7–22.8) and one had a lower BMI (16.9).

**Trauma**

None of the cases reviewed showed evidence of trauma at the onset of disease.

**Corticosteroid and alcohol**

Only four patients had a history of glucocorticoid administration and two patients reported daily consumption of alcohol. One of them had both corticosteroid and alcoholism.

**Secondary contralateral hip osteoarthritis**

There was insufficient evidence to suggest that patients with
RDA have a higher risk of developing osteoarthritis in the contralateral hip than patients with OA (26).

Bone mineral density (BMD)
One study reported that no significant differences were observed in BMD between RDA and OA patients (27).

Clinical characteristics

Symptoms and signs
A total of 17 cases included the pain and limitations reported by patients suffering from RDA. Because of the intractable severity of pain, two patients underwent a total hip replacement (2,9). Twelve patients were reported to have 38.3±3.07 (range, 33–42) points in the Harris Hip Score (15). Two patients were unable to walk because of the pain (8,11). One case reported the pain level as 9/10 by visual analog scale and their Barthel Index was 25 suggesting extreme dependence for others when carrying out daily activities.

Comorbidities
The cases reported hyperlipidemia, tonsillectomy, coronary heart disease, diabetes mellitus, occlusive arterial disease, rheumatoid arthritis, hypertension, systemic lupus erythematosus, ochronosis, severe platelet deficiency,
liver cirrhosis, immune thrombocytopenic purpura, and esophageal varices as comorbidities of RDA.

**Medications**
Two patients used hydroxychloroquine and methotrexate for rheumatoid arthritis. One used thrombopoietin receptor agonist and Kenketsu Glovenin-I for immune thrombocytopenic purpura (9).

**Blood tests**
Nine cases reported normal blood tests in patients while seven cases reported higher than average erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP).

**Pathophysiology**

**Subchondral fracture and bone marrow edema**
Of the cases with reported or clear radiographs, the subchondral fracture could be seen in 11 cases. There were nine cases reporting bone marrow edema in the acetabulum, femoral head and neck, or the irregular focal high-intensity bands.

**Osteoclasts infiltration**
Mature and activated osteoclasts were present in the synovium of RDA patients. Tartrate resistant acid phosphatase (TRAP) positive multinuclear giant cells present in synovial membrane showed the nature of osteoclasts (12,13).

**Experience in treatment**
Most patients were treated with nonsteroidal anti-inflammatory drugs (NSAIDs) and some patients were treated with alendronate sodium hydrate and alfacalcidol. They all reported negligible effects on the advance of the disease. Fifteen patients received total hip arthroplasty with no complications reported. Two other patients refused to have surgical treatment. The cohort studies also reported total hip arthroplasties (THAs) in 164 patients. The mean interval of time from hip pain onset to the surgery, reported in 16 cases, was 26.5 weeks, with a range between 6 and 54 weeks. The total blood loss was significantly greater in arthroplasty performed for RDA than patients with osteoarthritis. Sex, age and extra body weight index (BMI) had no significant effect on bleeding (14-16). The mean Harris Hip Score improved significantly after surgery (15). THA achieved a good midterm outcome comparable to that for patients with primary or secondary osteoarthritis (15,28). Complications of the surgery were not different.
from complications suffered by osteoarthritis patients.

Other findings

The number of TRAP-positive multinuclear giant cells present in the synovial membrane obtained from RDA patients was significantly larger than that obtained from OA patients (13). The osteoclast count on the bone surface from the RDA patients was greater than that from the osteoarthritic patients (12).

Discussion

RDA is an unusual, poorly diagnosed disease whose pathophysiology and etiology are still unknown. Various aspects of RDA continue to attract a lot of attention from both researchers and clinicians. In this literature review, we searched potentially relevant articles in the databases and reviewed the references of the articles. We then summarized the epidemiology and clinical characteristics of RDA from all the cases reported so far, and investigated the potential risk factors, diagnostic modalities, and experience in treatment. Accordingly, this article aims to provide evidence for improving the diagnosis and treatment of RDA.

Several potential risk factors have been proposed in the literature, including: (I) ageing; (II) female gender; (III) underlying health problems such as rheumatoid arthritis, diabetes mellitus and systemic lupus erythematosus; (IV) lower bone mineral density; (V) higher BMI; (VI) medicinal drug use including NSAIDs and corticosteroid; (VII) alcoholism (2-17,19-24,27,29). In this study, we evaluated the risk factors and found the only prevalent factors were: (I) age greater than 60 years; (II) female gender; (III) underlying systemic disease such as rheumatoid arthritis, diabetes mellitus or systemic lupus erythematosus (2-17,19-21,23,24). There is insufficient evidence to support the relationship between BMD, BMI, medication and alcoholism and the occurrence of RDA (2,3,5,8,10,23,27,29). We did not find these factors to increase the risk of RDA.

Most patients consulted a physician because of hip pain that had appeared without previous trauma or falls, and most of the disease progression occurred within one year. As a result, these changes were described as “rapid” and “destructive” in literature. Many of the patients were able to walk during their initial medical consultations, which may lead to the doctor failing to make an accurate diagnosis. Some studies mentioned that RDA was caused by simultaneous bilateral shoulder joint collapse within a very short time, with minimal or low mechanical stress and severe osteoporosis (30). Although disease diagnosis is possible through physical examination and medical history, the first symptoms of RDA are neither specific to the disease nor clear. We suggest that any patient who has the above-mentioned high-risk factors should suggest the possibility of RDA to their medical practitioner and that further diagnostic measures should be taken.

Blood tests, including CRP and ESR, are nonspecific in this disease. We recommend an X-ray of the hip as the initial radiological examination; doctors were able to make an RDA diagnosis in all of the reported cases that had X-rays. In all patients, the X-rays showed that the weight-bearing area of the femoral head was flattened. Joint space loss at a rate greater than 2 mm per year, or if more than 50% of joint space had been lost in 1 year, were considered as RDA (1,31,32). MRI was also used in many cases and significant changes were found. It was reported that a unique presentation of severe bone destruction as a manifestation of chronic myeloid leukemia in the absence of blast crisis (33). There were bone marrow edema on acetabulum, femoral head and neck and the weight-bearing area and the articular cartilage was absent with the subchondral insufficiency fracture or subchondral bone destroyed (2,3,5-8,10,34,35).

Physicians should be aware of antidiastoles when making a diagnosis of RDA. Gorham-Stout Syndrome (Gorham's massive osteolysis) and RDA of the hip show similarities in the idiopathic rapid disappearance of bones. However, histological examinations have revealed that Gorham's massive osteolysis is associated with angiomatosis of blood vessels and sometimes with lymphatics (12). Charcot's joint (neuropathic osteoarthropathy) and RDA have similarities in the slight clinical signs with serious imaging manifestation. Diabetes mellitus is the leading cause of neuropathic osteoarthropathy, with additional associations including syringomyelia, meningomyelocoele and multiple sclerosis (36). It is easy to mistake RDA symptoms for symptoms of rheumatoid arthritis, septic arthritis, osteonecrosis of the femoral head, seronegative arthritis or osteoarthritis. The diagnosis of RDA should be exclusive.

We recommend direct joint replacement when the diagnosis is confirmed. Although cases with delayed replacement surgery showed no signs of malignancy or contralateral involvement (26), these patients showed negligible results on conservative treatment. Although Low-dose aspirin and monoclonal antibody against human receptor activator of nuclear factor-κ B ligand (RANKL) were benefit for maintaining bone mass and qualities by
activation of osteoclastic bone formation and inhibition of
osteoclast activities via cyclooxygenase-independent manner
(37,38), the use of drugs such as NSAIDs, alendronate
sodium hydrate and alfacalcidol had only mild or even no
effect on the patients with RDA (3,5,6,20,24,39,40). Total
hip replacement is probably the treatment of choice for
these patients. In 100 RDA patients treated with cemented
THA and followed up for a mean of 7.83 years, the Merle
d’Aubigne score was excellent or very good in 95 hips (41).
Yuasa et al. reported that after an average follow-up
duration of 9.3 years, the mean Harris Hip Score improved
from 38.3 to 81.1 in RDA patients and from 43.6 to 84.2 in
conventional osteoarthritis controls (15). During surgery,
the total blood loss of patients with hip osteoarthritis was
significantly less than patients with RDA (9,14,16,35). Sex,
age and extra body weight (BMI) had no significant
effect on bleeding (14-16). The present study cannot
explain the hemorrhagic nature of THA performed for
RDA. We suppose that the excessive bleeding may be a
result of the tissue edema or bone surface bleeding due to
subchondral fractures. Operative time and the complexity
of reconstructive efforts could be significantly reduced if
the correct diagnosis was made early and surgical procedure
was taken in time (32). Most RDA patients had the disease
in a single joint and a few patients were reported as having
bilateral RDA (21,23). Patients with RDA may not have a
higher risk of developing osteoarthritis in the contralateral
hip after THA, than patients with osteoarthritis (26).
But chronic lameness could lead to spinal diseases such
as lumbar scoliosis. Although outcomes in the reviewed
cases appeared to be satisfactory, this cannot be confirmed
because of the small number of cases with follow-up.

Bone is in a dynamic process of continuous remodeling
which helps to regulate calcium homeostasis, repair micro-
damage to bones from everyday stress, and to shape the
skeleton during growth (42). Although the rapid clinical
course and bone destruction in patients with RDA differ
from those generally seen with a degenerative process,
previously published reports have suggested that this
disease is degenerative in nature and is a form or subset of
OA (12,13,38). The reason why some joints undergo rapid
and progressive destruction remains unclear. If fragility
is the only cause of subchondral fracture in RDA, then
fractures might occur at the femoral neck rather than at
the head beneath the cartilage (43). Many paracrine or
autocrine factors that stimulate osteoclastic differentiation
and function in the active area have been studied (44,45).
In patients with progressively destructive arthropathy,