in sql server why sql added to @sql nvarchar(max) gets truncated?

In SQL Server, if you're seeing **truncation** when building dynamic SQL in an @sql NVARCHAR(MAX) variable, it's almost always due to one of the **following causes**:

**✅ 1. Implicit conversion due to string concatenation with non-MAX types**

If you **concatenate NVARCHAR(MAX) with a shorter NVARCHAR(N) or VARCHAR(N)**, SQL Server **implicitly downcasts** the result to the smaller type **and truncates** it.

**🔴 Problem Example:**

sql

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DECLARE @sql NVARCHAR(MAX) = ''

DECLARE @tableName NVARCHAR(100) = 'MyTable'

SET @sql = @sql + 'SELECT \* FROM ' + @tableName

If any of the parts (@sql, literals, variables) are of shorter type like NVARCHAR(100), the **concatenation result gets silently truncated** to that smaller size.

**✅ 2. Mixing string literals without explicit N prefix**

If you use a **string literal** (like 'some text') without prefixing it as **Unicode** (N'some text'), SQL Server treats it as VARCHAR, not NVARCHAR.

Mixing NVARCHAR(MAX) and VARCHAR can cause implicit conversions and truncation.

**🔴 Problem Example:**

sql

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DECLARE @sql NVARCHAR(MAX) = ''

SET @sql = @sql + 'SELECT \* FROM MyTable' -- This is VARCHAR!

**✅ Fix:**

sql

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SET @sql = @sql + N'SELECT \* FROM MyTable' -- Correct: N-prefix for NVARCHAR

**✅ 3. Using VARCHAR(MAX) instead of NVARCHAR(MAX) when calling sp\_executesql**

If your @sql is NVARCHAR(MAX) but you pass it into a VARCHAR(MAX) parameter (or use EXEC(@sql) without N), SQL Server truncates when converting Unicode to ANSI.

**✅ 4. Concatenation inside loops with fixed-length intermediate variables**

If you build SQL in a loop and use a variable of fixed length (e.g., NVARCHAR(4000)), it will truncate each time silently.

**✅ How to Avoid Truncation**

* Always declare your dynamic SQL variable as \*\*NVARCHAR(MAX)\*\*.
* Use N'...' for all string literals being concatenated.
* Make sure **all variables you concatenate are NVARCHAR(MAX)** or at least NVARCHAR, not VARCHAR.
* Avoid using EXEC(@sql) without N if you're using Unicode.
* Use sp\_executesql with NVARCHAR(MAX) only.

**🔍 Example (Safe Version)**

sql

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DECLARE @sql NVARCHAR(MAX) = N''

DECLARE @table NVARCHAR(128) = N'MyTable'

SET @sql += N'SELECT \* FROM ' + QUOTENAME(@table)

-- Execute

EXEC sp\_executesql @sql